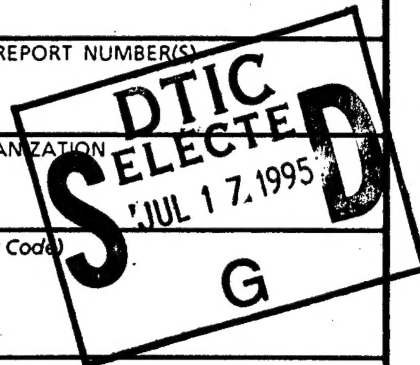


REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS N/A	
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT UNLIMITED	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE				
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION	6b. OFFICE SYMBOL (if applicable)	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code)		7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Naval War College	8b. OFFICE SYMBOL (if applicable) 35	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) Code 35 Naval War College 686 Cushing Road Newport, RI 02841-1207		10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
		WORK UNIT ACCESSION NO.		
11. TITLE (Include Security Classification) An Appraisal of the Current Methodologies DOD Uses to Identify Critical Defense Industrial Base Capabilities				
12. PERSONAL AUTHOR(S) MAJ Camille M. Nichols, U.S. Army				
13a. TYPE OF REPORT Final	13b. TIME COVERED FROM Mar 95 TO June 95	14. DATE OF REPORT (Year, Month, Day) June 15, 1995	15. PAGE COUNT 87	
16. SUPPLEMENTARY NOTATION				
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP		
			Industrial Base, Industrial Base Program, Industrial Pre- paredness Program, Defense Industry, Industrial Base Rationalization	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>The main purpose of this research is to do an appraisal of the methodologies utilized by the Department of Defense (DOD) and the military Services to evaluate and manage the defense industrial base. The appraisal will test the hypothesis that DOD is capable of identifying the critical defense industrial base capabilities that the United States must have to accomplish its National Security objectives in the 21st century. The current processes used in each Service and DOD will be evaluated for their effectiveness in managing the defense industrial base to date, and how effective they would be in the future. The effects of the government structure and culture, and the political and economic situation on the current methods will also be looked at since they are major influencing factors in the government's decision making and resource allocation processes. Recommendations addressing the deficiencies discovered in the processes will be presented in the hopes of improving the defense industrial base of tomorrow.</p>				
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL CDR W.S. Burns, USN, Deputy Director ARP			22b. TELEPHONE (Include Area Code) 401-841-2101	22c. OFFICE SYMBOL 35A



NAVAL WAR COLLEGE
Newport, RI

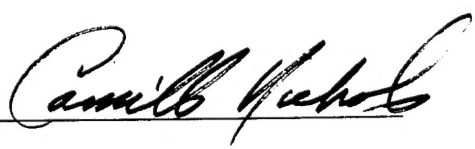
AN APPRAISAL OF THE CURRENT METHODOLOGIES DOD USES
TO IDENTIFY CRITICAL DEFENSE INDUSTRIAL BASE CAPABILITIES

by

CAMILLE M. NICHOLS
Major, US Army

A paper submitted to the Director, Advanced Research Department as an Advanced Research Project in partial satisfaction of the academic requirements of the Naval War College for the degree of Master of Arts in National Security and Strategic Studies.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: 

Paper directed by
Colonel David P. Oberthaler
Department of Joint Military Operations

Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

Executive Summary

AN APPRAISAL OF THE CURRENT METHODOLOGIES DOD USES TO IDENTIFY CRITICAL DEFENSE INDUSTRIAL BASE CAPABILITIES

A smaller, more lethal, more technologically advanced, and more integrated military force is envisioned in the future. The underlying premise in these strategies is that the United States will have the ability to produce this force. The assumption that the defense industrial base will have the capability to develop, manufacture, and support the supplies and equipment necessary may in fact be a very dangerous one. The effects the smaller defense budgets are having on the U.S. defense industrial base are dramatic and unparalleled in United States history. Intense, detailed, focused planning must be done on the defense industrial base.

Current rationalization of the industrial base, and the limited weapons system production remaining in this century will severely limit what resources will be left for producing military equipment in the future. Therefore, industrial base planning must focus on identifying the United States' ability to produce the military goods needed in the next century. Clearly, this would be a paradigm shift in how the defense industrial base is analyzed and discussed. The focus would change from one on current company production limitations to a focus on national capability enablers for tomorrow's weapons systems. The free-market system will not ensure that the means to produce the future war winning military

19950714 014

equipment are available. The question that must now be answered is can the current Department of Defense methodology used in assessing the industrial base adequately identify the critical capabilities needed in the future.

The main purpose of this research is to do an appraisal of the methodologies utilized by the Department of Defense (DoD) and the Military Services to evaluate and manage the defense industrial base. The appraisal will test the hypothesis that the DoD is capable of identifying the critical defense industrial base capabilities that the United States must have to accomplish its National Security Objectives in the 21st Century. The current processes used in each Service and DoD will be evaluated for their effectiveness in managing the defense industrial base to date, and how effective they would be in the future. The effects of the government structure and culture, and the political and economic situation on the current methods will also be looked at since they are major influencing factors in the government's decision making and resource allocation processes. Recommendations addressing the deficiencies discovered in the processes will be presented in the hopes of improving the defense industrial base of tomorrow.

CHAPTER I

INTRODUCTION AND OBJECTIVES

The military is always being accused of preparing to fight the last war. Today, this is not the case. Military planners are focusing on the next century and developing strategies to ensure the military is strong, prepared and postured to meet any future contingency. The force envisioned is a smaller, more lethal, more technologically advanced, and more integrated military force. The underlying premise in these strategies is that the United States will have the ability to produce this force. The assumption that the defense industrial base will have the capability to develop, manufacture, and support the supplies and equipment necessary for the envisioned force may in fact be a very dangerous one. The effects the smaller defense budgets are having on the U.S. defense industrial base are dramatic and unparalleled in United States history. DoD must conduct detailed, focused planning on the defense industrial base now in order to retain this "Fifth Service"¹ as a viable part of the national security equation. The United States cannot ignore the industrial base any longer if the U.S. is going to be the dominant power in the next century.

Industrial base planning in the past focused on identifying limitations or bottlenecks in the defense industrial base that would impact on a company's ability to produce more items quicker for either a short time (surge), or a long time (mobilization). The attention these bottlenecks received by resource managers since the 1950s has varied. Most of the efforts to eradicate the bottlenecks were minimal due to either a lack of funding priority or an aversion to directly influence the industrial base. Current rationalization of the industrial base, and the

¹ LTG (Ret) Lawrence Skibbie, "Prudent Defense Base Blueprint Critical to U.S. Security," Army RD&A Bulletin, (January-February 1994): 10.

limited weapons systems production remaining in this century will severely limit what resources are available for producing military equipment in the future. Therefore, industrial base planning must focus on identifying the United States' ability to produce the military goods needed in the next century. Clearly, this would be a paradigm shift in the analysis and focus of the defense industrial base. The shift in focus would be from current company production limitations to a focus on national capability enablers for tomorrow's weapons systems. The free-market system will not ensure that the means to produce the future war winning military equipment are available. Department of Defense planners must be able to shape the current "free-fall"² of the defense industrial base so that the industrial base capabilities required in the next century are available when needed. Can DoD do this? Can DoD use its current industrial base methodologies to assess the defense industrial base to adequately identify the critical capabilities needed in the future? This paper will attempt to answer these questions.

The main purpose of this research is to do an appraisal of the methodologies utilized by the Department of Defense (DoD) and the Military Services to evaluate and manage the defense industrial base. The appraisal will test the hypothesis that DoD is capable of identifying the critical defense industrial base capabilities that the United States must have to accomplish its National Security Objectives in the 21st Century. This paper evaluates the current processes used in each Service and DoD to determine their effectiveness in managing the defense industrial base to date. The evaluation also conducts an appraisal of the effectiveness of these processes in managing the future industrial base.

² AUSA & ADPA, "A New Strategy for Defense Acquisition," briefing to Defense Conversion Commission (Alexandria, VA: September 1992), 9.

The defense industrial base is an integral part of the U.S. economy and is therefore subject to many pressures that influence the management of the defense industrial base. The paper presents four of these influencing factors in an attempt to portray the status the defense industrial base has in the United States and the Department of Defense. The factors are: the government structure; the government culture; the political situation; and the U.S. economic situation. These are major influencing factors in the government's decision making and resource allocation processes and they greatly impact DoD's management of the defense industrial base.

Chapter III lays out this paper's analytical methodology to look at the DoD methodologies used to manage the defense industrial base. Chapter IV contains the analysis of DoD's processes. Chapter V discusses the validity of the hypothesis and the implications of this research effort. Chapter VI discusses recommendations addressing the deficiencies uncovered in the DoD defense industrial base management process evaluations in Chapter IV. The recommendations provide some suggestions in the hopes of improving the defense industrial base of tomorrow.

In considering the transition to the future defense industrial base, it is important to understand the overall structure and condition of the current base. The next chapter provides a historical perspective, establishes the taxonomy that will be used in this paper to describe the defense industrial base and provides the foundation for this paper's research efforts.

CHAPTER II

THE INDUSTRIAL BASE

President Clinton recently stated, "The domestic industrial and technological base is the foundation for national defense preparedness."¹ The national industrial base is also the essence of America's economic security and global leadership, and the importance of the base should not be understated. Today, there is an ever increasing globalization of this national base and a diminution in the share dedicated to defense. Two of the major concerns of today's leaders are how these things impact the defense industrial base and the ability of the U.S. to produce and sustain weapons systems. Broadly defined, the defense industrial base is the collection of public and private assets conducting research and development, manufacturing, maintenance and services for the armed services.² The topic of this paper is the defense industrial base. However, because it is so inextricably a part of the national industrial base it cannot be discussed in isolation. So, this appraisal will include references to the commercial or private industrial base as well.

The U.S. defense industrial base (DIB) is not a collection of separate government controlled companies. Nor is it a huge, military industrial complex. The DIB employs less than 10% of the U.S. manufacturing work force; viewed another way, the national industrial base is approximately ten times larger than the DIB.³ It is a heterogeneous collection of

¹ President, Executive Order 12919, "National Defense Industrial Resources Preparedness," Federal Register (7 June 1994) vol. 59, no. 108, p.29525.

² Government Accounting Office, Defense Industrial Base: An Overview of Emerging Issues (Washington, D.C.: GPO, 1993), 1.

³ U.S. Department of Defense, "Ensuring Defense Industrial Base Capacities, Capabilities," Defense 93 (Washington, D.C.: GPO, 1993), 24.

companies that are as different as their products are diverse. Their commonality is only in the buyer of their goods; they sell their products, directly or indirectly, to the Department of Defense. The monopsonistic nature of this one buyer market brings with it many responsibilities for the buyer that cannot be taken lightly, especially now, during the rationalization of the DIB.

What is really in the DIB? How do the actions of the Federal government and DoD effect the industrial base? What are the ramifications of this market not being "free," and the subsequent effects of the government's laissez faire policies? Can DoD shape the DIB; should it? How will the U.S. know if the DIB can support the armed forces in the next century? These are some of the questions that people trying to create a defense industrial base strategy for the 21st Century must answer. This paper will answer some of these questions and provide a foundation to better understand the complexity of the industrial base debates.

Some of these fundamental principles include understanding exactly what is in the DIB, how it is structured, and why it is important. The hierarchical structure of the DIB must be looked at in order to understand the linkages between the different levels of suppliers and the differing affects DoD budgets and policies have on these levels. The structural framework has been the cornerstone for the development and implementation of the industrial base preparedness planning and industrial base assessments that DoD has conducted for the past 75 years. The following taxonomy provides the basic terminology and structure needed to understand the history of the industrial base. It is also needed to understand the development of the premise for the conduct of this research; specifically, why an appraisal of DoD's methodologies used to assess and manage the defense industrial base must be conducted.

TAXONOMY

Thousands of companies exist in the United States. Many of them, in one manner or another, are part of or impact on the defense industrial base. A serious discussion of the capabilities of the industrial base can not begin before establishing a common basis of reference. The industrial base is a system that has structure and control. Both structure and control are relative to the type of product or service being provided within the base, and the product's buyer. The most common way to categorize these non-homogenous companies is by their hierarchical level in the production process. The lowest level consists of the materials needed to make the product. These materials are transferred to the next higher level to be processed further into a product and then sold to the next higher level, where it will be combined with other products to be processed into a component for a system. This continues up the chain until the final producer delivers the weapon system or subassembly to DoD. Figure 1⁴ portrays this defense industrial base structure. There is a lot of discussion on what number of tiers most accurately reflects the processing and uniqueness of the products at each level. Some analysts use these five tiers; other analysts may use as many as eleven tiers to delineate the DIB. Most often, the level of detail needed in the structure depends upon what the analyst is going to say about the base. A systems approach of analysis is going to be utilized here; therefore, a structure with six tiers is a better portrayal of the DIB. Each of the six tiers directly relates to one of the six levels in the work breakdown structure of every weapon system. This consistency in terminology will help those familiar with weapons system

⁴ Franz Frisch, "Structure of the Industrial Base," Lecture, Defense Systems Management College, Ft Belvoir, VA: November 1992.

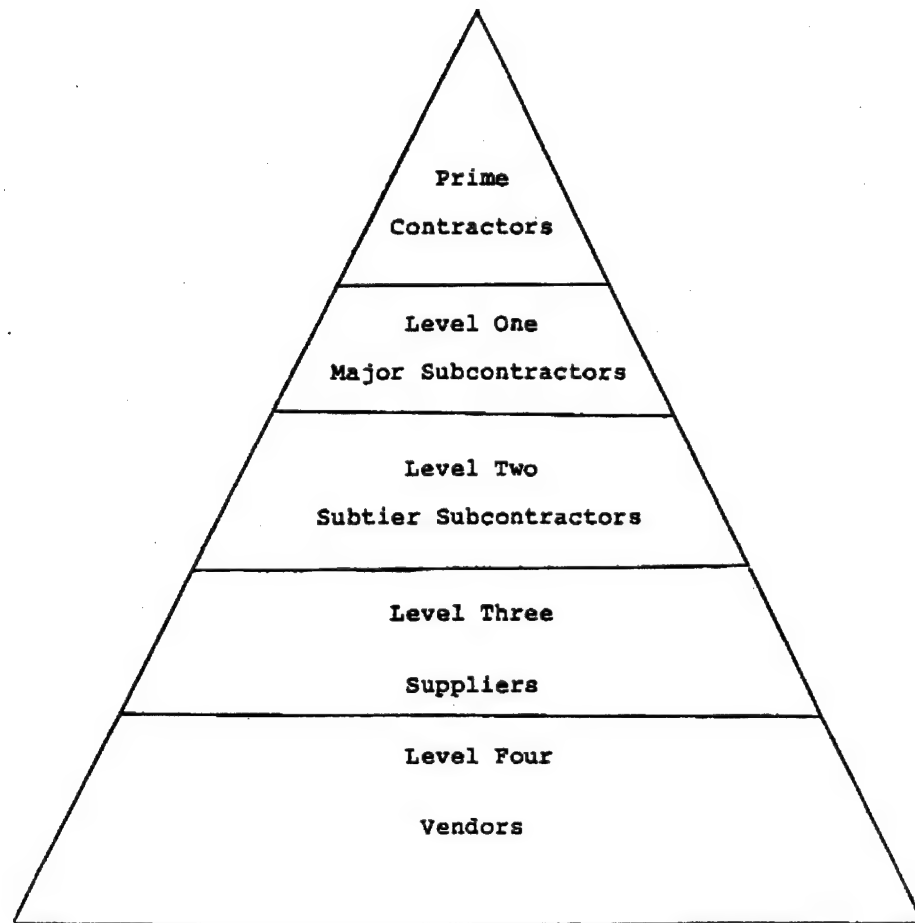


Figure 1 The Defense Industrial Base

design and acquisition better understand the structure. The first tier consists of the prime contractors responsible for the weapons systems. Tracing back the major steps in making the weapon would lead you down the tiers until the raw material level was reached. Table 1⁵ illustrates this, and provides examples of typical subassemblies, components and products.

TABLE I
Levels of Products

CONTRACTOR	PRODUCT LEVEL	NAME OF PRODUCT AND PRODUCT DEFINITION	KEY ACTIVITY AT EACH LEVEL	PRODUCT EXAMPLES
Prime Contractor	I	<u>SYSTEM</u> The end product	<u>Assembling</u> system from subsystems	ship, aircraft, tank, missile
First Level Subcontractors	II	<u>SUBSYSTEM</u> A subassembly of the end product; a major subdivision of the end product	<u>Assembling</u> subsystem from components	engine, bilge air conditioning unit, gun, avionics
Lower Level Contractors	III	<u>COMPONENT</u> A fundamental constituent of a subsystem or an end product; a number of elements joined together to perform a specific function and capable of disassembly	<u>Assembling</u> component from element	carburetor, pump, heat exchange, audio-frequency, amplifier
	IV	<u>ELEMENT</u> A fundamental constituent of a component or a subsystem; one piece, or a number of pieces joined together which are not normally subject to disassembly without destruction	<u>Making element</u> from material	screw, gear, roller, front wheel bearing, frame
	V	<u>MATERIAL</u> The basic ingredient (material) from which an element is produced	<u>Refining and/or forming</u> material	fuel oil, plate, wire casting
	VI	<u>RAW MATERIAL</u> The mined (or untransformed) material	<u>Extracting raw material</u>	ore mine, oil field, forest

⁵ Franz Frisch, "Structure of the Industrial Base," lecture at Defense Systems Management College, Ft. Belvoir, VA, November 1992.

This tiered system further classifies defense suppliers by the market in which they sell their products. Suppliers can have military-only, commercial-only, and commercial-military product lines. The traditional government relationship is with the prime contractors or their major subcontractors. DoD does purchase components and subassemblies from the vendors for spares and maintenance operations; but, it is the prime contractors who generally establish the requirements for the second tier. The second tier then tasks the third tier, and so on down the chain. Estimates state that suppliers below the third level account for more than half of the manufacturing costs in a weapon system.⁶ A report that cites the Department of Commerce's statistics that "Nearly 50 percent of DoD procurement is with small business" further highlights the importance of the lower tiers.⁷ It is important to understand the magnitude of these statements because the lower tiers are the essence of tomorrow's weapons systems as well. The alarming thing here, is that almost none of DoD's industrial base analyses or plans focus on the lower tiers.

Some recent research has been conducted to understand the effects the recent U.S. economic recession and the declining defense dollars were having on the lower tiers. Industrial base experts are realizing that the triangle shown in Figure 1 may be much too simplistic to capture the true picture of the situation at the bottom of the industrial base. It also fails to show the complex interdependencies between the levels. Figure 2⁸ gives a much

⁶ Eric Gentsch and D. Peterson, A Profile of Defense Manufacturing Costs and Enabling Technologies (Alexandria, VA: Logistics Management Institute, 1993), 3-1.

⁷ Richard M. Williams, "Small Business Manufacturing -- An Important Component of the U.S. Defense Industrial Base" (Unpublished Research Paper, Industrial College of the Armed Forces, 1993), 12.

⁸ Frisch, "Structure of the Industrial Base," Lecture at Defense Systems Management College, Ft Belvoir, VA: November 1992.

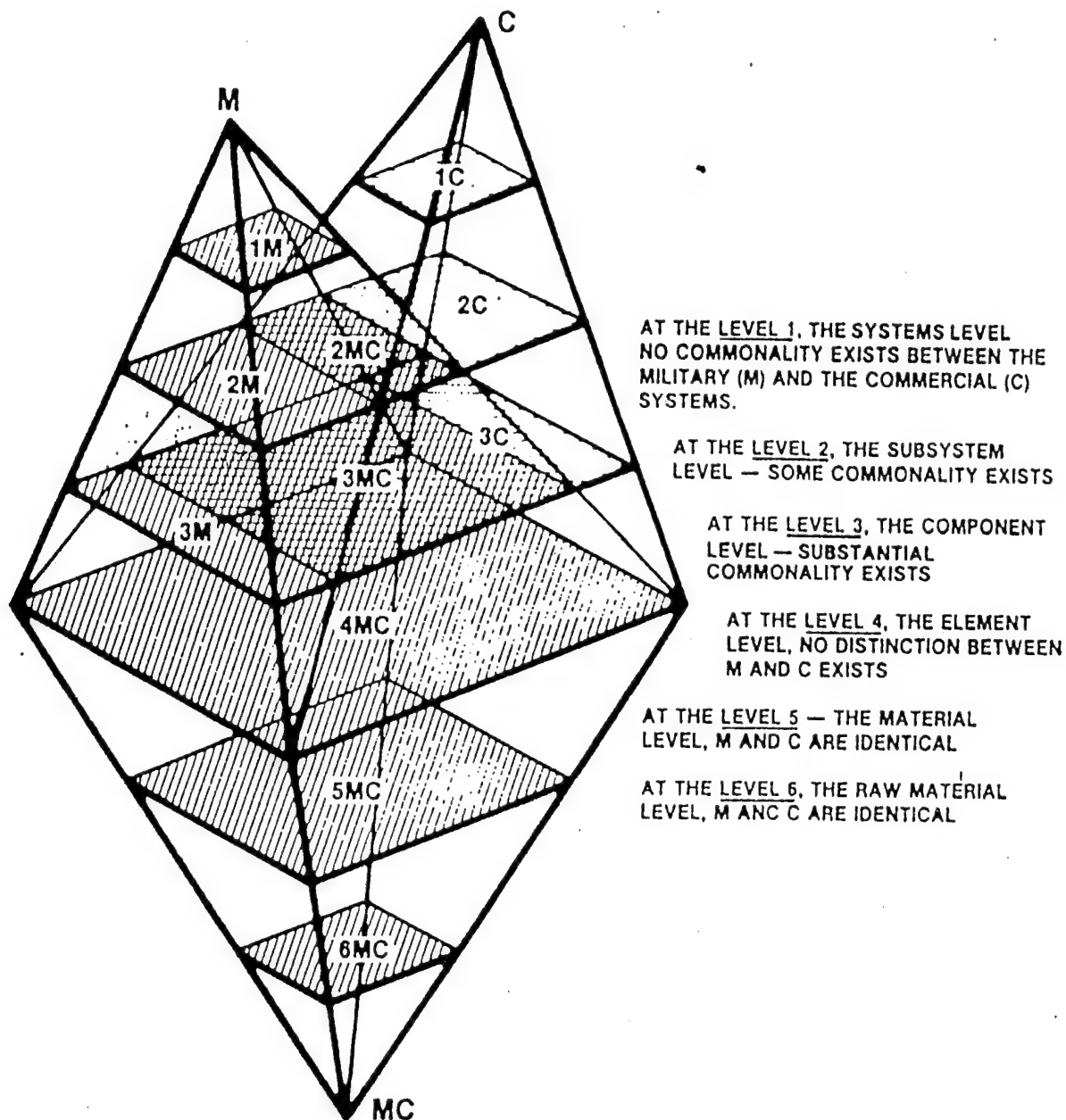


FIGURE 2
MILITARY-COMMERCIAL
INDUSTRIAL BASE STRUCTURE

more realistic representation especially of the interconnectivity between the military and civilian industrial bases. The following discussion uses this figure to further categorize the defense industrial base.

Industry has performed a few studies focused on the lower tiers to trace the vertical linkages of a subassembly down to its material suppliers. The defense industrial base appears to constrict at the lower levels instead of broadening out as shown in Figure 1. The studies corroborated this phenomenon. There appear to be fewer contractors at the lowest tiers instead of more as shown in Figure 1. This becomes even more intuitive if you think of the limited number of raw material sources, especially for rare minerals, that exist in the world. With this understanding, the inverted pyramid then serves as a better model of the structure of the lower tiers.

The two upright pyramids, M represents military products systems and C represents commercial products system, portray the two systems and their interconnectivity in the national industrial base. The commercial system would in reality be significantly larger than the military's system, but it is shown this way for ease of illustration. Close examination reveals that it is only at tier 1, that there is a complete separation between the two systems. The commonality in purchased goods at the lower levels gives economies of scale to the entire industrial base system and makes military equipment more reasonably priced. This civil-military integration is one of the main industrial base initiatives of the current Administration, and a key principle to a healthy defense industrial base in the future. The planar areas 2MC and 3MC in Figure 2 will increase in size as more purchasing requirements drop military specifications and more funding and effort is invested in pursuing dual-use technologies. The

model also provides a visualization for military-unique products below the weapons system level. The non-commonality areas on each tier plane under the M pyramid represent these military-unique products.

Another separation that occurs in the DIB is the ownership status of the vendor. The vendor could be government owned or commercially owned. Government owned assets are numerous and include laboratories, research centers, test sites, supply centers, arsenals, and manufacturing plants and equipment. There are advantages and disadvantages to the government owning and operating production and research facilities. There are also economic and military readiness issues involved. This is why the public versus private workload debate becomes an important issue in understanding and trying to shape the future DIB. The side someone takes in this argument usually depends on how they view the Government's role in the economy or if they are located near one of these facilities. Political pressures aside, the public assets and the core capabilities they possess are an integral part of the future DIB.

The taxonomy thus far includes distinctions based on who the buyer for the vendor's goods is, the sophistication of the goods being provided, and the ownership of the vendor's facilities. The last distinction relates to the purpose for which the goods are made. Sectors are the divisions within the DIB based on the weapons system's purpose. Currently, DoD divides the industrial base into the following eight sectors: aircraft; ammunition; combat support; combat vehicles; electronics and communications; shipbuilding; space and strategic missiles; and tactical missiles and torpedoes. Some of the sectors are specific to just one of the military services, as in the case of the shipbuilding sector. Most sectors have implications for more than one Service. The Department of Defense has overall responsibility for ensuring

that the U.S. has a healthy, viable defense industrial base and that all of the sectors are properly managed. Therefore, DoD must take an active part in shaping the industrial base for the future.

The future looks bleak if you trust the recent headlines. Some examples include: "Lifeline in Danger," "Anatomy of Decline," and "Selling our Security: The Erosion of America's Assets." The losses in market share that the U.S. economy has suffered in both manufactured goods and in the high technological fields alarms most Americans. The decline in manufacturing in the U.S. in the late 1980s, followed by the drastic decreases in defense spending have caused a dramatic downsizing in the industrial base, the magnitude of which has not been seen since the de-industrialization that occurred after World War II. A better understanding of the laws, policies and activities that have occurred over the past seventy-five years that shaped the defense industrial base is provided next in order to understand the true magnitude of what is required to prepare the defense industrial base for the next century.

STATE OF THE INDUSTRIAL BASE

The basic purpose of the defense industrial base is to provide DoD the goods and services it needs to accomplish its missions during peacetime and wartime. The primary objective of the DIB then is to have adequate capability to do what is needed when it is needed. The easiest part of this objective has always been the ability to meet the military's peacetime needs. These peacetime needs are expected to be handled within the free market system. The more difficult task for DoD has been to ensure the defense industrial base was prepared to operate in emergencies. Preparedness became the watchword for the industrial base, and it is the concepts of mobilization and industrial preparedness that have been directing and shaping the defense industrial base for the last seventy-five years. Highlights from these years help provide an understanding of how industrial base management has evolved and how management policy and culture have impacted the defense industrial base.

DoD's management of the DIB has a very distinct meaning here. DoD influences and shapes the defense industrial base in two primary ways. First, it influences the DIB through procurements and acquisitions of equipment and services. This greatly impacts the DIB because of the sheer size of DoD's budget. Normal procurement and acquisition functions will shape the industrial base, thereby influencing what is in the DIB; but, their goals are to outfit the Military Services with needed equipment not to direct or control what is in the DIB. The Industrial Base Program is the second way DoD shapes the DIB. It is a formalized management process -- its goal is to manage what is in the DIB. Management of the DIB means the focused, planned, and directed control of what is in the DIB; therefore in this paper

actual management of the DIB is accomplished through, and synonymous with, the Industrial Base Program.

Historical Perspective⁹

Pre-World War II

Military and Congressional leaders could not forget the harsh lessons the U.S. learned by not conducting any industrial base planning prior to the U.S. entry into World War I. They moved quickly to correct this error by enacting the National Defense Act of 1920. This became the first law to effect the industrial base by establishing planning offices within the War Department to conduct mobilization planning. Industrial Mobilization Plans were performed during the 1930s, but they were controversial and were not used for World War II. The greatest value of this period is that a formal organizational structure tasked to perform mobilization planning now existed.

World War II - 1950

Today, most people think of the defense industrial base in terms of the unprecedented growth in weapons production that occurred during World War II. Terms such as 'butter into guns', and the 'arsenal of democracy' are used in reverence to the herculean efforts expended. What many fail to realize is that it took years to create the arsenal and that it took until mid-1943 to reach peak production rates. The arsenal did contribute to the victory, and the U.S. emerged from the war as an economic and military global power.

⁹ Rod Vawter, Industrial Mobilization: The Relevant History (Washington, D.C.: National Defense University Press, 1893), entire book used as source for background information and paraphrasing in this section.

The U.S. saw with keener insight the value of having the industrial base prepared for emergencies.

Significant legislation was passed and control was established over critical materials and readiness planning. Two of these laws were instrumental in changing mobilization planning from a conceptual process to one that included authority for actions. The Strategic and Critical Materials Stockpiling Act of 1946 set up the strategic stockpile. The National Security Act of 1947 created the National Security Resources Board to coordinate all civil and military mobilization efforts in the United States. Unfortunately, not as much interest was given to the dismantling of the production facilities that followed the end of the war. A lot of the tooling and machinery was discarded and sold for metal scrap. These tools and machines were essential for the production of military weapons and unfortunately were not available at the start of the next war.

Korean War - 1970

The 1950s ushered in a new era in national strategy -- containment of communism. That focus created the need for new industrial base legislation. The Defense Production Act (DPA) of 1950 is one of the most significant pieces of legislation relating to the industrial base. It was historic in the direction it gave to government and industry in focusing U.S. national assets to oppose aggression anywhere in the world. The Office of Defense Mobilization and the Defense Production Administration were established. Industrial base preparedness and mobilization efforts expanded and the industrial base increased as a result. The two goals for the DIB were to successfully arm the military forces in the Korean War and build up large war reserves to deter the Russians from initiating hostilities. Each of

the Services established organizations to conduct mobilization planning on their equipment and to monitor the DPA programs and build the war reserve stockpile based on the D to P concept.

Implementation of new initiatives really began to shape the defense industrial base. The Priorities Allocation Program, the Preferential Planning List, and the Industry Preparedness Measures Programs all permitted the government to give contractual and acquisition program preference to companies that were in one of these programs. This caused some concern from the industries, especially from companies that did not make any 'list'. Standardization was lacking between the Services on how they treated mobilization planning and the interest the Services gave to these programs. This added to this growing disenchantment with DoD and industrial base planning process.

After learning in 1955 that the Russians had nuclear bombs, the U.S. changed its national security policy from massive retaliation to flexible response. There was also a strong belief in the short-war scenario against the Russians that permeated all of the long-range planning and production support for weapons system. Basically, the war with Russia would not be a long one; conventional fighting would only go on for a short time before one side or the other deployed a nuclear weapon. You do not need a very large surge or mobilization base to support that scenario. As a matter of fact, the U.S. Air Force did almost no mobilization planning during this period. The amount of industrial base planning and the fiscal support to industrial base programs began to decline again.

The Vietnam War was far less demanding on the industrial base than World War II or the Korean War. Production rates increased on many items; however, the Services and

industry used existing production facilities and the U.S. required no mobilization of production facilities for weapons or materials. The lack of attention the DIB received during the latter part of the 1960s began to show in government reports. This is reinforced by the fact that the primary tool that was being used for mobilization planning, DD Form 1519, Industrial Preparedness Planning Production Survey, was found to be almost worthless by industry and government representatives. The overall sentiment on the DIB is captured in the following passage from an industrial base paper, "The United States is the only major nation that does not treat its defense industrial base as a critical national resource."¹⁰

1970 - 1980

The defense industrial base was a very low priority most of this decade. The war in Vietnam was ending, and the nation had little interest in support for anything military. The first half of this decade found military planners still believing in the short-war scenario with the Russians. Industrial preparedness programs received low levels of funding, and small war reserves existed. However, it was not just the industrial base that suffered; readiness, training and military infrastructure were also underfunded.

This short-war scenario required making adjustments in planning timelines. Reductions in mobilization stockpiles occurred when the D to P planning period changed to D+6 months. The Services continued to do industrial preparedness planning and did fund some of the needed manufacturing improvements. The actual preparedness posture of the entire defense industrial base is unclear. The only test of the industrial base came during the

¹⁰ Lee D. Olvey, ed., Industrial Capacity and Defense Planning (Lexington, MA: Lexington Books), 107.

Yom Kippur War in 1973 when the U.S. supported Israel with weapons and military equipment. The U.S. discovered that it could not replace these items in the U.S. inventory as quickly as it wanted to because the U.S. producers had difficulty surging their factories. However, this problem was not important enough to raise the interest level of the military and political leader for the defense industrial base. Koechel states in his study on surge capacity, "A major reason cited for the United State's lack of surge capacity is inadequate production capacity, especially at lower levels of the defense industrial base. Industrial preparedness studies indicate that little is known about the support capabilities of second and third tier subcontractors."¹¹

1981-1991

The Reagan years brought increased funding for defense research, development and acquisition of technologically superior weaponry. Increased acquisition spending was viewed as a boost for the defense industrial base and good for the U.S. economy as well. Industrial base planners were now concerned that the tiers were saturated with work and might be incapable of providing the extra products required during a military crisis. Surge capability became the focus of the industrial base assessments made during the mid-1980s.

The long-war scenarios began to get more attention. The war with Russia would now be a long war because the probability was very low that either side would deploy nuclear weapons. This would require large quantities of equipment and supplies and a large mobilization base. Massive stockpiling of equipment and weapons was done in preparation

¹¹ Brian Koechel, "The Surge Capacity of the US Industrial Base: A Macro View" (Unpublished Research Paper, Armed Forces Institute of Technology, 1993), 26.

for the long European battle. The paradox here is that with all of the money being spent in the industrial base it should have been very healthy; instead, report after report announced the decline of the base and declared it unable to support national security objectives. Other factors began influencing the industries. The burden of the government procurement system, the loss in U.S. manufacturing capacity, the loss of global market share, and the recession in the late 1980s were all factors in the erosion of the commercial and defense industrial base. The lower tiers are estimated to have suffered the greatest losses.¹²

There was so much uncertainty about the value and need for an industrial mobilization program of the magnitude called for in the DPA, that the Production Act was allowed to expire by Congressional inaction in 1989. The Act was re-issued in 1992 with amendments that changed the manufacturing support programs and increased DoD's reporting requirements. Industrial preparedness and mobilization planning were expanded to include the Graduated Mobilization Response program in 1988 which is run by the Federal Emergency Management Agency. In spite of these changes, the utility of industrial base planning still remained suspect. Desert Storm was a great testament to superior weaponry and technology, but it did not validate the work and money spent on industrial base planning. A report published on the DIB by DoD states, "Army planning in ODS was with [DD Form] 1519 data from 1989. It was not appropriate to a regional crisis with little or no warning."¹³

¹² Amy Borrus, "A Life Raft for Arms Makers," Business Week, 16 March 1992, 122-124.

¹³ U.S. Department of Defense, Office of the Secretary of Defense, Assessing the Adequacy of the Industrial Base (Washington, D.C.: 1992), I-3-5.

Current Situation

The defense industrial base has received new tasks as a result of the changing national security and national military strategies. In 1992, DoD gave the Services guidance on the tasks the defense industrial base must accomplish: support the base force in peacetime; support planned contingencies; reconstitute quicker than any emerging global threat can grow; and try to do this cheaper and more efficiently than the U.S. has been doing.¹⁴ The focus is on meeting these requirements with as small a budget as possible. As the defense budget has gotten smaller and smaller, surge, mobilization and reconstitution have become unaffordable concepts and are no longer discussed at the senior Service levels. In August 1992, Deputy Secretary of Defense Donald Atwood canceled the two regulations that required the Services to establish an industrial preparedness program and to perform industrial preparedness planning. New guidance has been pending ever since.

The industrial base policy announced in 1993 by Secretary of Defense Les Aspin echoes the industrial base tasks stated above, and reinforces the DoD shift away from preparedness planning and towards critical capability retention. He states, "[DoD should] Identify and take steps to preserve only those unique defense-related skills, facilities, processes, and technologies needed to execute the program, likely to be essential beyond the program, and not likely to be economically reconstituted."¹⁵

¹⁴ U.S. Department of Defense, Defense Acquisition White Paper, forwarded by Don Yokey (Washington, D.C.: 1992), 4.

¹⁵ U.S. Department of Defense, Office of the Secretary of Defense, FY1995-1999 Defense Planning Guidance (Washington, D.C.: GPO, 1995), 52.

This is the fourth downsizing of the industrial base in this century. Even though this should be a familiar occurrence -- build-up, win the war, draw down -- the situation today is actually very different. Today, the U.S. no longer has a comparable enemy. The U.S. faces many enemies of various strengths in various regions throughout the world. The U.S. does not have as robust an economy as it did after World War II that can easily absorb unemployed defense industry workers or more companies looking for a piece of a smaller market. There is also a sensing in the defense industry that this time the down sizing of the DIB is likely to be a permanent condition.¹⁶ Now that the Cold War is over, other demands are being made on the fiscal resources once set aside for defense. So, the U.S. must rationalize the defense industrial base accordingly. After the preceding discussion, the question that begs asking is how will we know if the reduced U.S. defense industrial base will have the right capabilities to support the nation in the 21st Century. If the U.S. defense budgets continue to drastically limit the amount of acquisition and purchasing DoD can do, then the Industrial Base Program's role in managing the defense industrial base will become even greater than it is today. This is a grave concern in light of over fifty years of inefficiency and ineffectiveness in the Industrial Preparedness Program.¹⁷

¹⁶ U.S. Defense Conversion Commission, Defense Drawdown: Financial Overview and Strategies for the Top 25 Prime Contractors (Washington, D.C.: GPO, 1993), 30.

¹⁷ Koechel, 30.

CHAPTER III

ANALYTICAL FRAMEWORK

The Industrial Base Program, formerly the Industrial Preparedness Program, is the basic methodology that the U.S. has been using for the past seventy-five years to manage the defense industrial base. An important point worth repeating here, is that this paper considers the Industrial Base Program DoD's formalized industrial base management process -- its goal is to manage what is in the DIB. Normal procurement and acquisition functions will shape the industrial base, thereby influencing what is in the DIB, but their goals are to outfit the Military Services with weapons and equipment -- not to manage what is in the DIB.

The Industrial Base Program focuses on the shortfalls and deficiencies found in the defense industrial base. The primary objective of the Program is to ensure that military arms and equipment are available when needed to support national military objectives. Simplistically put, the program consists of tools to identify problems in the industrial base and tools to eradicate those problems. The Table 2 shows the most relevant aspects of the Industrial Base Program. The assessment tools focus on capacity to produce critical items, weapons and equipment, in sufficient quantity. The improvement tools focus on removing the inhibitors to production of these critical items and to increase efficiency, competitiveness and responsiveness of the industrial base. The assessment tools are the focus of this research.

Table 2
Industrial Base Program

<u>Assessment Tools</u>	<u>Improvement Tools</u>
Acquisition Program Analysis	Manufacturing Technology Program
Production Base Analysis	Industrial Preparedness Measures
Industrial Preparedness Planning:	Industrial Modernization Incentives Program
DD Form 2575 Method	DPA Title III Program
DID Method	
DIBP Method	
Special Studies Method	

The Industrial Base Program methodology involves three steps. First, the Military Services and the Defense Logistics Agency (DLA) conduct assessments on items within the scope of their basic mission area. Next, the Services and DLA choose the appropriate Improvement Tools to fix problem areas discovered during the assessments and programming and budgeting decisions are made accordingly. In the last step, DoD reports to the President and Congress on the state of the industrial base in a macro-level Production Base Analysis. The assessments are the heart of the Industrial Base Program and are the instruments used to shape the preparedness posture of the industrial base.

The assessments are not done on every piece of equipment and weapon; that would be impractical if not impossible. Each Service has its own process in selecting items for analysis; but, usually each Service includes items listed on a JCS critical items list (CINC-CIL). 'Critical' is the operative word for conducting the assessments. The Services conduct assessments on the items they deem critical to the accomplishment of their non-peacetime missions and on each new weapon system being developed. The two

essential elements of this Program then becomes the ability to identify the items that require assessment, and the ability to determine requirements for these items during the crisis scenarios used for war and preparedness planning.

These two elements of the Industrial Base Program -- item selection and requirements determination -- were the foundation for managing the current industrial base. They are also going to be used by industrial base managers to manage the industrial base of the next century because the same assessment tools that managed the critical items of yesterday are going to be used to manage the essential capabilities of tomorrow. Without big procurement spending, the Industrial Base Program will have a larger role especially in the aspect of preservation of capabilities.

HYPOTHESIS DEVELOPMENT

The end of the Cold War provides a unique opportunity to change the current structure of the defense industrial base. The nuances of government procurement coupled with the declining defense budget have created a less than ideal business environment for DoD. The current DIB has excess capacity, quality control problems and obsolescent capital equipment. The companies in the DIB focus on short-term profitability and have subsequently cut back on research and development funding and capital investments.¹ DoD was at one time the driving force in all U.S. technological areas; this is far from true today in most technology areas. There is strong evidence that DoD is no longer getting the best or the most that its money can buy. The OTA states, "In sum, studies indicate that the current level of segregation has resulted in inefficiencies and redundancies that have restricted the exploitation of scarce national technology industrial base resources."²

In spite of the huge cutbacks in defense spending shown in Figure 3, this does not have to be a doomsday proclamation. DoD has the chance to rid itself of the burden it created in the DIB by following its own acquisition and industrial base policies. Even though industry is unhappy about this downsizing, DoD should view this as an opportunity to rid itself of excess capacity and modernize the weapons production processes. "The dilemma, therefore, is not that the industrial base is shrinking, but, rather that military

¹ Ethan Kapstein, The Political Economy of National Security. A Global Perspective (Columbia, SC: University of South Carolina Press, 1992), 99.

² Office of Technology Assessment (OTA), Civil-Military Integration (Washington, D.C.: GPO, 1994), 8.

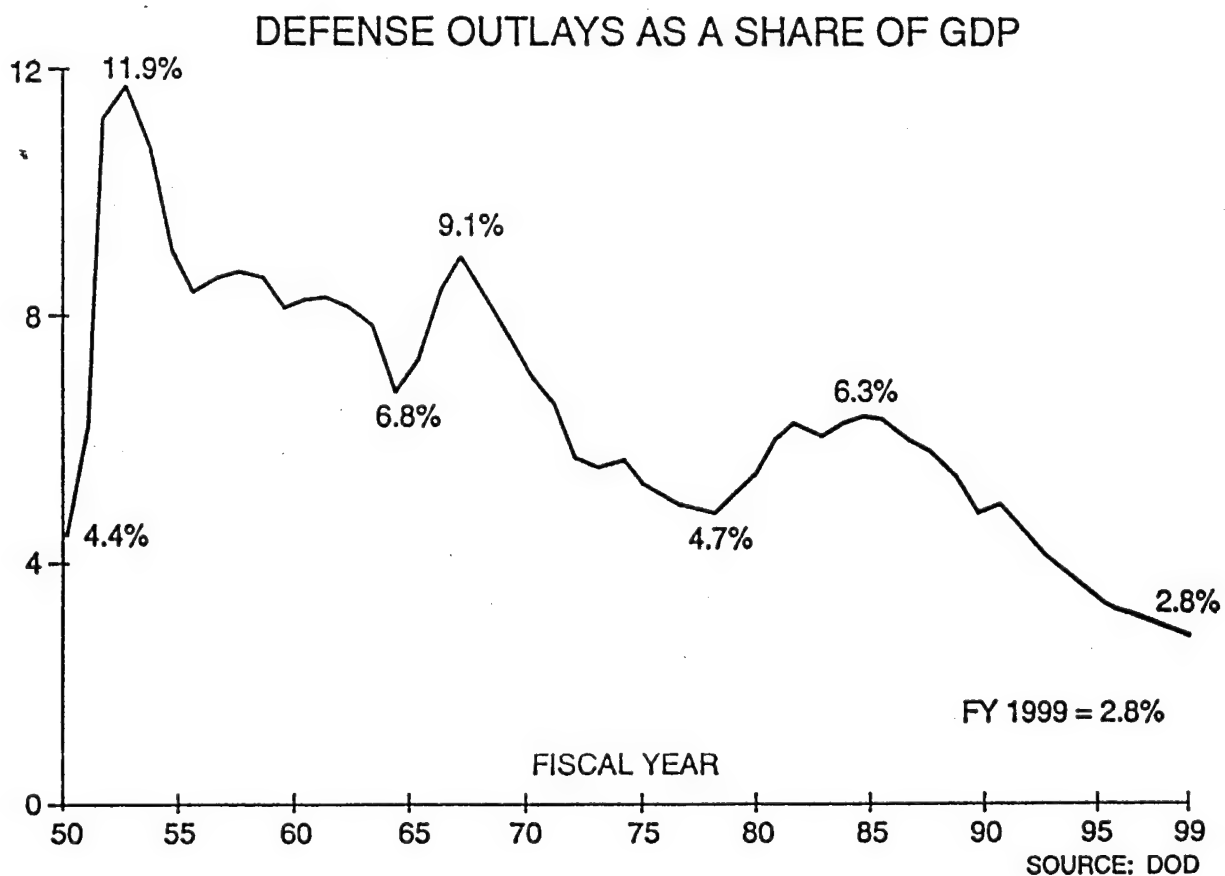
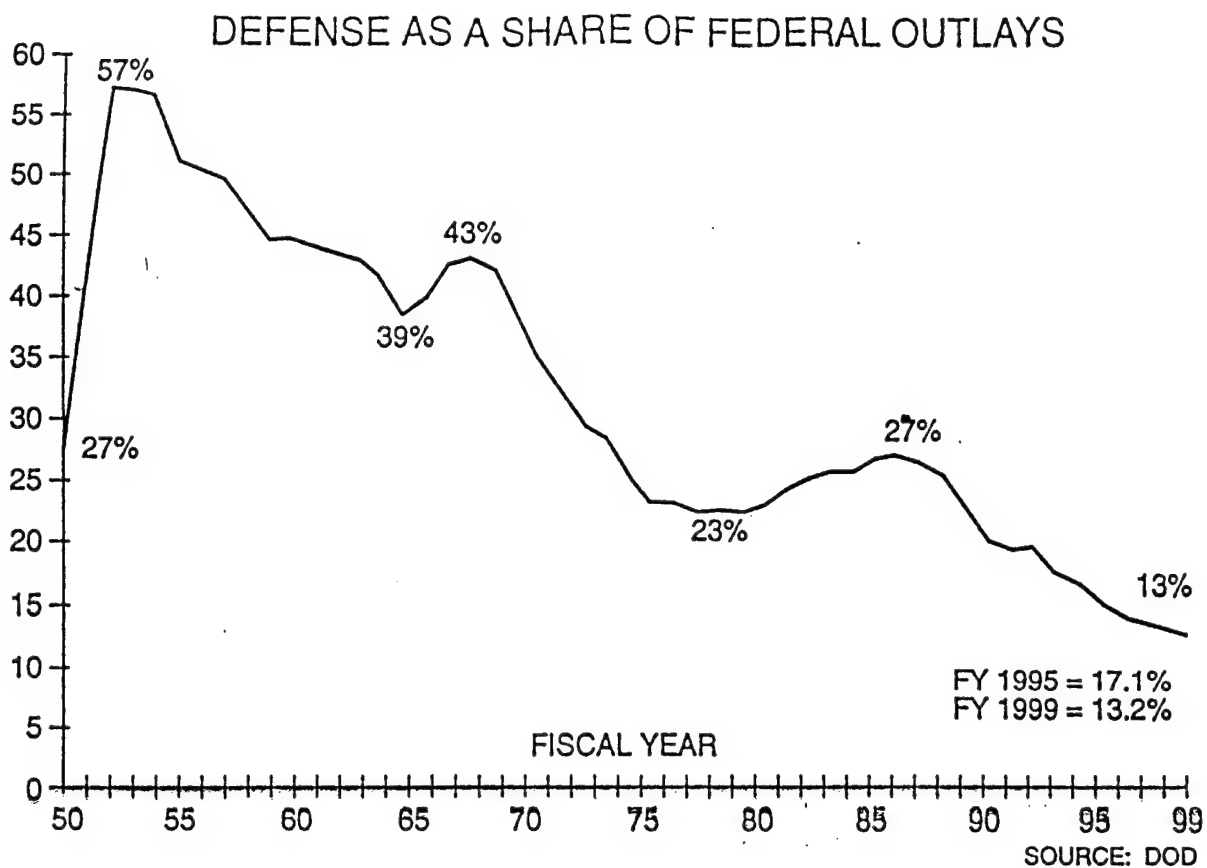


Figure 3

indispensable capabilities need to be retained.”³ The key is not to repeat history and allow the loss of essential elements of the DIB; the government must make the changes to sculpt the DIB into the shape the U.S. will need in the future.

The U.S. Government has legislated many programs in the past two years focused on making some of the necessary changes in the DIB and on easing the country's economic burden of the downsizing. Programs such as the acquisition reform initiatives, the economic conversion program, the funding for dual-use technologies, and the civil-military integration efforts will accomplish some of these needed change.

As explained previously, the defense industrial base is very complicated and shaping the base is not a job that can be solved with a few fiscal investment programs. The U.S. must do more than this. The industrial base is such a complex structure that to study it in its macro sense only allows sweeping generalizations and non-specific recommendations. In order to sculpt the future defense industrial base, studies must focus on specific problem areas and provide specific recommendations.

The industrial base must be reduced to a manageable level in order to study it properly. First of all, not all segments of the defense industrial base need attention. Commercial and dual-use development and production can satisfy many of DoD's current and future acquisition needs. This is especially true now with the benefit of the programs mentioned above. The competitiveness in this market will take care of reducing the excess capacity and rationalizing this part of the base. This does not apply in all portions of the DIB.

³ LTG (Ret) Lawrence Skibbie, "Prudent Defense Base Blueprint Critical to U.S. Security," Army RD&A Bulletin (January-February 1994): 10.

There are parts of the defense industrial base that do not have any commercial utility. Figure 2, on page 10, portrays these military unique items as areas 1M, 2M, and 3M. Some examples of unique systems would be tanks, military helicopters, missiles, and certain types of ammunition. Subsystem and component examples would include: tank track pads, rocket motors for self-guided missiles, super high thrust jet engines, and large ammo casing shells. The capability to produce systems and components like these will not be saved by the free market.⁴

Companies are free to leave a market that no longer has a demand. If the Army is not buying any more tanks, then the tiers of companies needed to make the tank will close or go on to make other items. The ability to make entire tanks in the future may not exist in this scenario. The U.S. must guard against this type of situation. On the other hand, if certain essential capabilities were identified and retained by DoD, then the ability to make entire tanks could be recreated given the money and time and these retained essential capabilities. The question becomes, how can DoD ensure the military-unique capabilities that are essential for tomorrow's defense industrial base will be available so that the needed weapons can be produced in time.

The question has two aspects. First, you must identify the essential military-unique capabilities that must be saved and then, you must take actions to ensure these capabilities survive. The actions needed to save the capabilities is the easier part of the question to solve. There are many preservation approaches from which to choose and some historical precedents that can help identify the one most appropriate. There would

⁴ AUSA & ADPA, "Defense Industrial Base Briefing" (Alexandria, VA: AUSA meeting, 1992), 2.

be time to readjust if the industrial base planners take the wrong action. This would not be the case if DoD did not have a capability that it needed in the future because it had failed to identify that capability. You cannot use what you do not have. This paper takes on the harder aspect -- how to identify the capabilities that must be preserved -- by looking at DoD's Industrial Base Program to see if it is capable of doing what is required. The hypothesis that logically follows from this is that DoD is capable of identifying the essential DIB capabilities that the U.S. must have to accomplish its National Security Objectives in the 21st Century.

APPRAISAL METHODOLOGY

The test of this hypothesis is conducted by analyzing each of the assessment tools that are part of the Industrial Base Program. The approach for this analysis has two parts: first, an evaluation will be made on how successful each tool has been in accomplishing its current objectives; then, an assessment will be made on the appropriateness of using these tools to refocus and identify essential capabilities. Unfortunately, there is no quantitative way to analyze the assessment tools. The appraisal will be a subjective evaluation drawn from existing industrial base studies; commentaries done by industrial base experts; interviews with current DoD industrial base managers from each Military Service and the Office of the Secretary of Defense (OSD); and a review of the legislation and the written procedures pertaining to the Industrial Base Program.

The procedures for each of the assessment tools are described, and how each of the tools has been used by the Services and DLA (if appropriate) will be discussed. Each tool will then be evaluated against the criteria in Table 3 to see if that tool has been successful and if it can be used to identify essential capabilities.

Table 3
Evaluation Criteria

Management Involvement: focus, funding, manpower, consistency, culture
Data Adequacy: accuracy, usefulness, effectiveness
Met Current Objectives: identified critical items, responsiveness of DIB
Meet New Objectives: identify essential military-unique capabilities

Critical item and essential capability are two terms used by DoD in the discussion of the industrial base. Even though these are rather simple terms that are often used interchangeably in everyday discussion, they have very complicated implications in industrial base and are not interchangeable. In the conduct of this appraisal, critical item will mean what it has since the inception of the Industrial Base Program. It refers to an item that will be needed during a national emergency but may not be available because it may be in short supply due to a lack of physical capacity or means to produce it in the industrial base. The assessment tools were used to look at specific companies and their manufacturing facilities to enhance the production process to make more critical items. Essential capability focuses on having the ability, not necessarily the capacity, to produce a component. The term is more conceptual in nature and does not focus on the companies. One part of the test here will be to see if the current assessment tools can be used to accommodate this changed focus.

This study will not produce hard data that can prove that the current Industrial Base Program methodologies will or will not be able to properly identify the essential military-unique capabilities. In order to test the hypothesis, the study is structured to provide a solid overall appraisal of the effectiveness of the Industrial Base Program's assessment tools during the past seventy-five years. Then, a prediction based on deductive reasoning will be made of the Program's ability to be effective in identifying essential capabilities. The analysis that follows provides insight into the configuration of the industrial base today as well as thoughts on how to manage tomorrow's industrial base.

CHAPTER IV

ANALYSIS OF CURRENT INDUSTRIAL BASE PROGRAM METHODOLOGIES

Today's defense industrial base has been shaped by the daily government purchases made to support its operations and infrastructure and by the Industrial Base Program. As stated earlier, the Industrial Base Program was established to prepare the DIB to transform the industrial base from its peacetime activities into an emergency producer of additional military equipment needed to support the national military objectives. The assessment tools are most often used on weapon systems, components, spare parts, and sectors to give an overview the entire defense industrial base. The Military Services and DoD are directed by legislation and regulations as to when, why, and which tool should be used to make an assessment on some aspect of the industrial base.

The analysis of the assessment tools is presented in four sections. The first section describes the purpose of Industrial Preparedness Planning and discusses the three methods used to conduct it. Each method is evaluated against the criteria of management involvement, data adequacy and the method's ability to meet the current industrial base objectives. Production Base Analysis will then be discussed and it will be evaluated against the same three criteria. Acquisition Program Analysis will be the last assessment tool discussed and it will also be evaluated against the three criteria. In each of these sections, the determination will be made if the tools have been successful in managing the current industrial base. The research material for the evaluations conducted in these three sections comes from a multitude of government, industry and academic sources.

Government regulations and policies provide the detailed description of each assessment tool. Industry sponsored studies and government directed studies on these tools were good sources of critique and ideas for improvement of the assessment process.

The last section of this chapter evaluates the assessment tools against the last criterion -- the ability to meet the new objective. The appraisal will discuss how the new objective is different from the old objective, and how the assessment tools would be affected by this difference. A determination will then be made as to the appropriateness of using these assessment tools to identify essential capabilities. This determination will be subsequently applied to the entire Industrial Base Program because the assessment tools are the foundation for every other aspect of the Industrial Base Program.

The appropriateness determination will be based on three conditions. The first condition is how well each tool fared against the first three criteria found on Table 3, page 31. The second condition is how applicable the tool is for focusing on capabilities instead of the current capacity related issues. The last condition is how the Industrial Base Program is expected to be implemented in the future.

INDUSTRIAL PREPAREDNESS PLANNING

Industrial Preparedness Planning (IPP) is the central part of all of the assessment tools used on the industrial base today. Both the Production Base Analysis (PBA) and the Acquisition Program Analysis (APA) depend on information provided from Industrial Preparedness Planning. There are four methods to conduct IPP. The Department of Defense (DD) Form 2575 Method, the Data Item Description (DID) Method, the Direct Industrial Base Planning Method (DIBP), and the Special Studies Method. Items are selected for preparedness planning based on their importance to the anticipated military missions.

Each Service and DLA develop a list, the IPP List (IPPL), of these items. The items are usually weapon systems and components of these weapon systems that have been listed on the CINC-CIL. The number of items on each Service's list depends on their interpretation of the Industrial Base Program and the need for preparedness planning. The guidance on selection of the items is that they are essential for the conduct of military operations in combat and that they have one or more of the following criteria: "require a long lead time; require development of, or additional capacity to meet emergency production requirements; require continuous surveillance to assure preservation or an adequate base to support emergency production requirements; and require critical skills or specialized production equipment."¹ The Army consistently has 2,000 items, the maximum allowed, on their IPPL. The Air Force has had as few as 140 items.²

¹ U.S. Army, Planning Logistics Support for Military Operations, FM 701-58 (Washington, D.C.: 1982), 12-1.

² U.S. General Accounting Office (GAO), DOD's Industrial Preparedness Program Needs National Policy to Effectively Meet Emergency Needs (Washington, D.C.: GPO, 1981), 26.

DD Form 2575 Method

Information must be obtained on these items in order to conduct the required planning. The mechanism to do this is the DD Form 2575, formerly DD Form 1519. The DD Form 2575 Method, the DID Method and the DIBP Method are all dependent on the data collection process of the DD Form 2575. The main differences among the three methods is who is directing the contractor to conduct the data collection on the critical item, and how the contractor is being paid to do the data collection.

The data collection process is based on the producer of the item providing the information on the DD Form 2575. The industrial base analyst gives the forms to the 1st or 2nd tier contractors depending on if the item is a weapons system or a system subassembly. In the DD Form 2575 Method the Military Services have the Defense Logistics Agency's government plant representatives work with the contractor to complete the data collection and submit the completed forms to the requesting Service. The DD Form 2575 Method is a voluntary program. The contractors are under no obligation to provide the data on their plant or on the lower tiers that supply products to their plant. Contractors who participate in the program will work with the government's representative to work out necessary acceleration schedules and process improvements that will help during surge and mobilization crises.

DID Method

Administration of the DID Method is slightly differently than the DD Form 2575 Method. The Government's production contract with 1st or 2nd tier contractors includes Data Item Descriptions that allow the military acquiring activity to obtain preparedness

Data Item Descriptions that allow the military acquiring activity to obtain preparedness planning information on the items purchased. The contractor, if directed by the contracting officer, must provide the information. In this case, DoD will pay the contractor for the data collection process. This method is usually used on major weapons systems and the major subassemblies for those systems. The DD Form 2575 is the mechanism used to acquire the information. The contractor gives the completed forms to the appropriate program management personnel so that realistic production schedules can be made and so that potential production bottlenecks during military emergency situations can be identified.

DIBP Method

In some cases, the activity acquiring the weapon system or component may choose to deal directly with the item producer instead of using the DLA plant representative. The DIBP Method allows the acquisition activity to work with the contractor. DoD uses the DD Form 2575 to get the information from the contractor and his suppliers. The acquiring activity will work with the item producer to obtain accelerated production schedule agreements and reduce bottleneck situations that might arise.

Special Studies

The three methods discussed above provide information about a specific weapon system. However, there is also a need to look at broader aspects of the defense industrial base. The Special Studies assessment tool is the mechanism used to accomplish this. The three categories of Special Studies are; Sector Studies, Production Base Analysis and Other Studies. Production Base Analysis has now become legislated at the Military

Service level and for DoD. A separate section discusses the Production Base Assessment since its importance and focus have changed significantly. Special Studies is an all encompassing category that could include any type of analysis that someone desired to have done on the industrial base. The focus of these studies is not on a specific critical weapon system or component, but on a broader segment of the industrial base.³ Examples of these studies include: the periodic Sector Surveys that each Military Service performs; an Air Force study on landing gear manufacturers; a Department of Commerce (DOC) study on the subcontractors for three related missile weapon systems; and a DOC study done for the Navy on the U.S. gear industry. DoD conducts special studies to respond to inquiries by Congress and to concerns on the level of preparedness planning being conducted.

Special studies are expensive to perform. The studies are generally focused on a narrow portion of the defense industrial base. The analysts obtain some of the data from the DD Form 2575. In almost all cases, the government gets the data from the contractors. The Sector Surveys (or Studies depending on the Military Service) are analyses performed on a group of weapon systems. Chapter II discussed the main sectors of the industrial base. The sectors tend to align along weapons systems that have similar properties. This eases the analytical process and allows for generalizations. Industry Associations have arisen that focus on specific military sectors. These Associations provide information and often perform the Sector Studies for the Service. The Sector Studies will normally only focus the analysis on the Prime Contractors in the sector being

³ U.S. Defense Systems Management College, Integrating Industrial Preparedness into the Acquisition Process. A Guide for Program Managers (Washington, D.C.: GPO, 1989), 4-9.

studied. Some 2nd tier contractors may be discussed if there are known problem areas at that level. The Studies provide information to the Services in the hopes that appropriate decisions can be made on allocating resources to fix problems in the sectors related to the critical systems.

Evaluation

Preparedness planning has been going on for a long time. The arrival of the DD Form 1519 in 1968 formalized the data collection process. As the tiered industrial base system matured, and the impact of global economics was felt in the production of military systems this form became outdated. The revised data collection process was incorporated in the DD Form 2575. This new form did not really change how the data was collected or who was responsible for gathering the data. Some of the changes were focused on the inclusion of foreign supplier information in an attempt to understand the effects foreign sources of supply would have on mobilization. Another area that changed was in compensation to the contractor for completing the forms and being in the IPP Program. The contractor could get some reimbursement now under certain conditions.

In spite of these changes, the preparedness planning process is viewed by industry and government representatives as ineffective. IPP is better than it was, but it is still not very good. The controversy over the forms, the data, and the data collection process was so contentious that the Deputy Secretary of Defense limited the use of the DD Form 1519 in 1985. The DD Form 2575 was not introduced until 1991. Sector surveys and other special studies were conducted in the interim to provide the DoD with a general industrial base posture. The defense industrial base during this period, as described in Chapter II,

was not a priority. It is no wonder then, that it took so long to develop a new form and implement changes.

Each of the Services gives a list of the critical items that must have preparedness planning done on them to the Service's industrial base managers. They have industrial base analysts use one of the IPP methods to get information on these items and determine if there are producibility problems. If there are problems, then the analysts work with the contractor to minimize the problems using Tools from Table 3 as appropriate. If the producibility problems are properly identified on each critical item analyzed, IPP would receive a successful evaluation. Research shows that this is not the case at all.

The most condemning criticism of Industrial Preparedness Planning is the poor management of the Industrial Base Program. The negative impact that the lack of a strategy,⁴ vision, and even common definitions⁵ have had on the industrial base is a theme repeated over and over in the literature available. The historical overview and the preceding discussion have shown that DoD has not been focused on the industrial base. Resources, both funding and manpower, to conduct the proper analysis have been lacking. The Air Force stopped conducting analysis on all spare parts because no funding was ever given to resolve problems discovered during Industrial Preparedness Planning.⁶

⁴ LTG (Ret.) Lawrence Skibbie, "Pentagon, Congress Must Support Restructuring of Fifth Service," National Defense 79, no. 500 (September 1994): 2.

⁵ James Miskel, Buying Trouble? National Security and Reliance on Foreign Industry (New York: University Press of America Inc., 1993), 178.

⁶ GAO, 20.

The Services have their own way of implementing the Industrial Base Program which puts industry in a difficult position because most large Prime Contractors work with more than one Military Service. The culture of the Services makes them reluctant to focus on the industrial base. Industrial base expert John Brinkerhoff states, "The military services themselves do not really subscribe to a substantial program of industrial preparedness. They would rather have a plane or a tank in hand than two in the plan."⁷ This lack in consistency, and the Service culture detract from the effectiveness of the preparedness planning process.

The core of preparedness planning is the data collection process. The accuracy of the data, the usefulness of the data, and the effectiveness of the data have been so bad that it prompted the cancellation of the DD Form 1519 Method. The changes brought about by this Method's replacement, the DD Form 2575, have not improved data accuracy very much. The quality of the data is still suspect because most of the contractors are still providing the data voluntarily and little verification is possible under the current government manpower situation. Congress, industry and even President Clinton⁸ are arguing that a new system to get reliable, accurate and timely data is necessary.

There is also grave concern that the information that is being requested is not the right type of information that DoD needs to make decisions focused on the future, and that the data collection process is focused at the wrong levels in the industrial base

⁷ John Brinkerhoff, "The Strategic Implications of Industrial Preparedness," Parameters 24, no. 2 (Summer 1994): 40.

⁸ U.S. President, Executive Order 12919, "National Defense Industrial Resources Preparedness," Federal Register (7 June 1994) vol. 59, no. 108, p. 29525.

structure. This dilemma was pointed out earlier; the problems are in the lower tiers and the data collection is focused on the highest tiers. The level of focus for the Sector studies is also too high. Discussions about the financial health of General Dynamics or FMC in the Tracked Vehicle Sector Study do not help identify and solve crippling problems at the track pad manufacturing plant. DoD states, "They [Sector Studies] therefore provide the Department with little insight concerning how to deal with the industrial base in the current political and budgetary environment."⁹

To synopsise, Industrial Preparedness Planning is not effective in meeting its intended purpose. The data collection process is not adequate and the management of the program is ineffective. Industrial Preparedness Planning has not gone deep enough into the industrial base structure to find the real problem areas in the defense industrial base. Industrial Preparedness Planning has not been an effective assessment tool. It has not been successful in managing the current defense industrial base and has not been an effective component of the Industrial Base Program.

⁹ U.S. Department of Defense, Industrial Base Capability Report to Congress (Washington, D.C.: GPO, 1993), xi.

PRODUCTION BASE ANALYSIS

The Industrial Base Program also has another assessment tool, the Production Base Analysis (PBA). As a method that used to be part of Industrial Preparedness Planning, the PBAs were also used to develop plans to remove the bottlenecks and constraints that would inhibit industry's ability to respond to a military crisis. The PBA would then be used to prioritize these plans for the allocation of available funds. PBAs prior to 1991 were also used as a mechanism by the Services to summarize their preparedness planning problem areas and describe how they would use the improvement tools and allocate their programmed industrial base funds. PBAs conducted in the future are expected to be more typically an overview document in light of the current legislation.

Congress legislated in the FY 1993 Appropriations Act that DoD would submit a PBA annually to Congress.¹⁰ This means that the Services must conduct annual PBAs. No guidance has been given to the Services on how to comply with this legislated requirement. As a matter of fact, the Services have been waiting for guidance on the Industrial Base Program ever since the DoD regulations were canceled in 1992. Even though the Services have not been required to conduct PBAs, the Army published a PBA in 1992. It did not discuss the Army industrial base. Instead, it discussed the changes that had occurred in the Industrial Base Program and the new initiatives that the Army was trying pending guidance from DoD on how the Program is going to be structured and focused in the future. The Navy and the Air Force have been performing PBAs, which are titled Industrial Base Assessments (IBA). They have developed their own way of

¹⁰ U.S. Congress, Senate, FY 1993 DoD Appropriations Act, 102nd Cong., 2nd Sess. (19 September 1992), S. 3114.

reporting on their portions of the defense industrial base. The IBAs are not published annually. All the Services are unsure if they will continue PBAs because of the cost and the limited utility they provide. The Air Force has decided not to conduct a PBA in 1995 for these very reasons.¹¹

Evaluation

PBAs conducted prior to 1992 based some of their conclusions and recommendations on information obtained through the DD Form 1519 process. All of the comments made in the Industrial Preparedness Planning evaluation about using this data process would apply here as well. The data would not adequately find the problems in the production process of the critical items studied. The Army did not publish a PBA from 1985 until 1992 because the canceled DD Form 1519 was their PBA data source.¹²

The PBAs are focused at a high level and are usually biased to support the Service's position on a certain weapon system or Sector.¹³ The PBA was not an effective tool; it could not ensure the critical items would be available during a military crisis. DoD found that the PBAs they received were of little value in gaining a realistic picture of the state of the defense industrial base and were too general to warrant programming or budgeting actions.¹⁴ PBAs in their current form do not meet the current objectives of the Industrial Base Program. DoD is still working on guidance to change the PBA.

¹¹ Major William Snyder, U.S. Air Force Staff Officer, Interview by author, 6 April 1995, Pentagon, Washington, D.C..

¹² U.S. Army, Industrial Engineering Activity, 1991 Army Production Base Analysis (Rock Island, IL: 1992), E-1.

¹³ U.S. Department of Defense, Office of the Secretary of Defense (OSD), Industrial Base Oversight, Report to Defense Conversion Commission (Washington, D.C.: 1992), 4.

¹⁴ *ibid.*, 4.

ACQUISITION PROGRAM ANALYSIS

The Industrial Base Program's last assessment tool is Acquisition Program Analysis (APA). The APA is now required on new weapons system programs in development; mandated by DoD Directives 5000.1 and 5000.2, the guidelines for weapons systems acquisition. It was realized that there would be a great deal of value in assessing the proposed production processes of a new weapon for problems before they were designed into the production facilities. Problems in surging or mobilizing the production facility could be alleviated or avoided by allowing a redesign before the production process is finalized. This analysis was needed because the other tools look at weapons already in production.

Evaluation

APA has only been implemented since the late 1980s; therefore, not much information is available on the effectiveness of this new assessment tool. APAs are only required on major weapons systems in development. There are few new major weapons systems in development now and even fewer, if any, are expected in the future. The majority of the APA format focuses the analysis on the 1st tier and some 2nd tier contractors. Because of this high level focus, concern exists that some of the problems have not been uncovered and there may be problems in increasing production in a military crisis. The Program Managers were not receptive to this new requirement because of the limited resources available to develop their system.¹⁵ This appraisal concludes that APA's effectiveness in meeting the Industrial Base Program's objectives of is questionable.

¹⁵ U.S. Defense Systems Management College, 1-4.

APPROPRIATENESS FOR ESSENTIAL CAPABILITY IDENTIFICATION

Three conditions must be met by the current Industrial Base Program in order for it to be considered adequate to be applied to identifying essential capabilities for the future defense industrial base. The conditions are: 1) The assessment tools received successful evaluations against the criteria shown in Table 3; management, data, and current objectives; 2) The applicability of using the current assessment tools to successfully determine essential capabilities; and 3) How the Industrial Base Program is expected to be implemented in the future. If the Industrial Base Program meets these conditions, then the hypothesis that DoD is capable of identifying the critical defense industrial base capabilities will be true.

Condition 1

The preceding evaluations support the conclusion that the assessment tools are not adequate to ensure that the industrial base has the capacity for the critical items analyzed. The inadequacies of the data collection process and the management of the entire Industrial Base Program have been documented since the early 1980s. Even though changes have been made to some of the assessment and improvement tools over the past few years, they seem inadequate to manage today's defense industrial base.

This implies that the health of the industrial base today is questionable, and the U.S. military's ability to meet U.S. National Military Objectives is suspect. It would be extremely difficult to prove the defense industrial base is not healthy or to prove that the health of the DIB was a result of the effectiveness of the assessment tools. No

quantitative measurement standards have been developed. However, Operation Desert Storm did require the industrial base to accelerate production of some products and provides some insight on the effectiveness of the current Industrial Base Program. An OSD analysis conducted on the Industrial Base Program after Desert Storm states, "Industrial Base planning for major end items appears to be of little value in responding to major regional contingencies..."¹⁶ Almost all of the current defense industrial base planning is in fact conducted on weapons systems and their major subassemblies.

These items are selected for planning from the critical items lists that are developed to support the military operations plans. The current military force structure planning is based on the ability of the armed forces to respond to two nearly simultaneous major regional contingencies; two scenarios similar to Desert Storm. Again, the facts question the ability of the current Industrial Base Program to meet the needs of these scenarios. An Air Force study done in 1992 states, "A central issue was that a surge/mobilization system was set up for World War II - style steady state operations, not fast operations, not fast response transient actions such as Desert Storm."¹⁷ Having a fast response capability is part of today's military doctrine, and it can be expected to be a fundamental planning factor for operations in the next century. The Industrial Base Program appears to have not kept pace with the changing military focus and doctrine. The Program cannot meet the criteria in Table 3, and fails the first condition of the applicability appraisal.

¹⁶ U.S. Department of Defense, Office of the Secretary of Defense, Assessing the Adequacy of the Industrial Base (Washington, D.C.: 1992), xi.

¹⁷ Don Dobeasky, John Starns, and Joe Ruzzi, Industrial Base Analysis of the Impact of Desert Shield/Desert Storm on Critical Air Force Weapons Programs (Arlington, VA: The Analytic Sciences Corporation, 1992), 3-4.

Condition 2

The current Industrial Base Program is focused on retaining what is critical for producing existing weapons and military equipment so that these items will be available for use today and over the next five years (the current budgetary programming process goes through 1999). However, what the U.S. is retaining today may not be critical or even important in 2005 or 2010. At the same time, some capabilities that are not being addressed by the current analytical methodology could disappear. The data collection process is focused on production capacity information on items currently in production. It is unrealistic to expect this system to be able to identify future, essential capabilities. The data collection process, to include the forms, would have to be totally revamped. The government personnel who make plant visits would have to undergo extensive retraining because maximum capacity and minimum sustaining rates would not be the primary focus of their evaluations. The length of the current planning process does not look far enough into the future to help the industrial base managers prepare for the next century. Long term planning and strategic visions are necessary to provide better insight into what types of weapons and equipment will be used in the future so that the ability to produce and sustain these items can be identified and focused to ensure they are available for tomorrow. The DD Form 2575 Method cannot be used to identify essential capabilities.

Trying to enhance capacity utilization at the higher tiers in the DIB is not the same as trying to find a unique process that may only exist at the 5th tier. The phrase essential and unique defense capabilities implies that you are going to find something that is not common, and is something that DoD must have to accomplish its missions. It may be a

one of a kind plant, or a process, or a machine, or a design, or even a technology. This unique thing may exist at any tier of any sector in the industrial base. You should not find one in the Army and one in the Navy, or have one in the Aircraft Sector and one in the Electronics Sector, or have one in the military depot system and one in the commercial industrial base. These redundancies would make the capability not unique any more, and would probably mean that the capability was not endangered either.

The current Industrial Base Program is not centralized and not done at a high enough level in DoD to be able to integrate the assessment process to eliminate Service rivalries and their sector protectional posture. This point was proven by the responses DoD received from the Military Services in October 1994 when it conducted an exercise to have the Services identify their essential domestic capabilities. The Services viewed this exercise as an attempt to get support for their critical weapons systems and industrial base problems they were having trouble getting funding support for in their Service budgets.¹⁸ The results were not acceptable; DoD is now trying to develop a handbook to guide the Services in identifying essential capabilities that are truly essential.

There is only one defense industrial base and it must be as small as it possibly can be and still be able to support the U.S. National Security Strategy. The essential unique defense capabilities will not be found using the current Industrial Base Program. The Program cannot be used to identify essential defense capabilities and fails Condition 2.

¹⁸ Snyder; Dick Barnett, Army Industrial Base Manager, Interview 3 April 1995, Army Material Command Headquarters, Alexandria, VA; and Commander Brian Kelm, U.S. Navy Staff Officer, Interview 3 April 1995, Pentagon, Washington, D.C..

Condition 3

The great opportunity that exists today to sculpt the future industrial base into a cost effective, efficient, and visionary component of U.S. national power is quickly passing. The historical lack of support for the defense industrial base limits the ability of change agents within DoD to get the necessary assistance now. The habitual short-sightedness of the Military Services, DoD and Congress binds their solutions to today's contractor problems and current production facilities. These factors have made the current Industrial Base Program ineffective in managing the defense industrial base. They have crippled the Industrial Base Program and will continue to do so in the future unless dramatic changes are made quickly.

DoD is in the process of developing new guidance for the industrial base and is trying to develop a new assessment tool that is focused on essential unique capabilities. The problem with the new tool is that it is envisioned to be done at the lowest level in the Military Service industrial base management structure and it will only be done on an exception basis. The assessment tool will be used if a contractor raises concern that he is an essential unique capability in the industrial base, and in danger of going out of business. The new tool has some very good qualities, but the management by exception philosophy will not ensure that all of the needed capabilities will survive the downsizing. The most significant problem with the program is that it will not be formalized and up and running for two to three years.¹⁹ The next century will already be here before this new essential capability methodology even begins!

¹⁹ John Goodman, Deputy Assistant Secretary for Defense, Interview by author, 6 April 1995, Pentagon, Washington, D.C..

The Services' approach to helping the industrial base in the past has been to obtain funding for additional weapons systems. This method of industrial base management gets more weapons for the Service and more profits for the prime contractors. However, this does little else to strengthen the entire defense industrial base structure since so little of these profits are being invested in capital improvements and so few contractors are looking towards the future. The U.S. cannot afford to purchase unneeded weapons any longer. The pressure from Congress and the Services is very strong to continue this way to manage the industrial base - more nuclear submarines, more tank upgrades, more B-2s are all gaining support to save the industrial base capabilities for the future. If this approach continues, the defense industrial base will not be saved at all.

The U.S. will be burdened by an inefficient, outdated group of 1st and 2nd tier contractors. This is not very different from what exists today in some of the industrial base sectors. In spite of Congressional rhetoric, indications are that no significant changes are expected in the implementation of the Industrial Base Program. You cannot expect to use the tools that were ineffective in managing the industrial base before, to be effective in shaping the future industrial base. The Industrial Base Program also fails the third and final condition.

The Industrial Base Program fails all three of the conditions. Unfortunately, this means that the hypothesis fails as well. DoD is not capable of identifying the critical defense industrial base capabilities. The assumption that the defense industrial base will have the capability to develop, manufacture, and support the supplies and equipment necessary to fight and win wars in the 21st Century is indeed a very dangerous one.

CHAPTER V

CONCLUSIONS

History is replete with examples of how dangerous it can be for a nation if it does not have a prepared industrial base. Chapter II highlighted the industrial base problems the United States has faced. The industrial base is an element of national power that, if strong enough, can even be a deterrent force. The U.S. is undergoing its fourth defense industrial base downsizing in this century and is on the verge of losing some of its DIB strengths. The U.S. may lose some of its essential unique capabilities. An appraisal of the methodologies utilized by DoD and the Military Services to evaluate and manage the DIB was conducted to see if these methodologies could be used to stop the loss of these essential industrial base capabilities.

A basic understanding of what the industrial base is and how to characterize the industrial base was necessary in order to have a common basis of understanding to follow the complex discussion presented. The U.S. cannot have a clean slate from which to build the DIB it wants in the future. It must start with the effects of the past seventy-five years worth of procurements, regulations, legislation, and national and global economic conditions. The historical overview summarizes how the current industrial base arose.

Today, the DoD procurement budget and the Industrial Base Program shape the defense industrial base; but, DoD primarily manages the DIB through the Industrial Base Program. The assessment tools are the foundation of the Program and are pivotal in the Program's ability to meet its objective to ensure that military arms and equipment are available to support national military objectives. The body of this appraisal was focused

on these assessment tools to test the hypothesis that DoD is capable of identifying the essential defense industrial base capabilities that the U.S. must have to accomplish its national security objectives in the 21st Century. The analytical process in this appraisal centered on evaluating each of the assessment tool's successes in meeting four criteria.

The evaluations thoroughly address each criterion and provide a detailed description of each of the assessment tools and how the Services used the tools over the years to manage the industrial base. The analysis shows that each of the assessment tools fails to meet each of the four criteria. The Industrial Base Program has in fact not been very effective in managing the current industrial base in spite of recent changes and some renewed interest in the state of the industrial base. Michael Rich in a recent RAND report on the industrial base supports this opinion:

Right now, we are stuck with woefully inadequate indicators - such as the number of companies doing business with the Pentagon in a particular year. The Defense Department must make it a top priority to develop the means to detect erosion on the defense industrial capability when it occurs and size the magnitude of erosion when it is detected. Until we have better indicators, we will have a poor understanding of the true health of the industrial base and the direction in which it is heading.¹

Overall, the current Industrial Base Program has not met its objectives and DoD has failed to properly manage the defense industrial base.

Implications of Research

The failures in managing the industrial base may have been easier to overlook in the past when defense budgets were large and the U.S. citizenry was willing to give up other programs for defense. This is not the case at all now. The defense budgets are

¹ Michael Rich, Evolution of the U.S. Defense Industry (Washington, D.C.: RAND, 1990), 14.

dramatically smaller and the defense industrial base is being rationalized. This research shows that there are serious problems in the way DoD manages the defense industrial base. Congress wants efforts made to protect essential capabilities instead of protecting specific companies; to protect skills not necessarily specific jobs; and to improve warfighting capabilities instead of buying unneeded weapons and equipment. Unfortunately, all of Congress' demands for improvement in the management of the defense industrial base have not been supported with the requisite funding.

DoD has been recalcitrant in responding to Congressional direction to establish a better management system, a new data collection and analysis system, an integrated assessment structure, a strategy for the defense industrial base, and an in-depth look at all levels of the industrial base. The next century will be here before DoD has been able to adjust to this new defense industrial base atmosphere. The danger is that many of the defense essential unique capabilities will probably disappear before DoD can get a handle on what capabilities must be saved.

There exists a great opportunity to have the DIB shed a lot of the antiquated machinery and processes that the past overregulation have caused. But, DoD must move faster to re-invent the Industrial Base Program; industry will not wait for guidance to downsize. Industrial base expert Jacques Gansler says it best: "Without [government led] restructuring, the U.S. defense industry will very likely devolve into a small, inefficient, ineffective, highly subsidized, and non-responsive drain on the economy."²

² Jacques Gansler, "Restructuring the Defense Industrial Base," Issues in Science and Technology 8, no. 3 (Spring 1992): 57.

Validity of Hypothesis

The fact that the current Industrial Base Program has not met its objectives means that DoD has failed to properly manage the current DIB. The Industrial Base Program as it exists today, cannot effectively focus on the task of identifying essential unique capabilities. The future industrial base must contain these essential unique capabilities and must develop new capabilities in order to meet the demands of the next century. This subsequently invalidates the original research hypothesis of this paper. Therefore, DoD is not capable of identifying the essential defense industrial base capabilities that the U.S. must have to accomplish its national security objectives in the 21st Century.

The fact that the hypothesis is not true does not mean that this research has been void of value. On the contrary, it reinforces the purpose of the paper and the need for an appraisal of the methodologies utilized by DoD and the Military Services to evaluate and manage the defense industrial base. The appraisal has revealed the weaknesses in the current Industrial Base Program and warns of the impending disaster if DoD does not change the methods of managing the industrial base. Scores of studies have reported the deficiencies in the management of the industrial base and the inadequacies of industrial preparedness planning process. Unfortunately, most of the recommendations have gone unheeded and DoD has allowed the DIB to erode. Changes are necessary now: "An infrastructure that can provide and sustain all the modern equipment necessary to support the Nation's armed forces in any given situation is a viable defense industrial base."³

³ U.S. Air Force, Air Force Systems Command, Industrial Base Assessment Guidebook (Wright Patterson AFB, OH: 1993), 1.

CHAPTER VI

RECOMMENDATIONS

Recent actions taken by Congress and DoD are positive efforts to change the government's way of doing business. They alone will not be enough to sculpt the defense industrial base needed in the next century. DoD must make dramatic changes in the management of the industrial base. The potential for loss of essential unique capabilities is so great right now that DoD must centrally manage and fully integrate the industrial base.

Preservation of essential unique defense capabilities should become the main focus of any new Industrial Base Program. DoD must eliminate of all duplicate efforts, and move towards consolidating work to take advantage of all efforts to realize economies of scale. To do this, the U.S. must create a strategic vision for the industrial base that DoD, the Services and industry can embrace in order to chart the most effective course into the future. This will require changes in culture, fiscal apportionment, laws and regulations and development of new methodologies. The following section presents two alternative methodologies.

Suggestions for Alternative Methodologies

The new method of assessing the industrial base that DoD is developing does offer some improvement over the current methods. DoD will provide a handbook to the Services that provides criteria for and examples of how to identify and maintain industrial capabilities that are both essential and in danger of being lost. The handbook will detail the steps that the industrial base managers should take to verify that a capability is essential and at risk of being lost. Solutions to retain the capability, if appropriate, will be

integrated into the regular budget and acquisition process. This method would look deeper into the industrial base tiers than the current methods. The handbook will be an additional assessment tool available for use on an exception basis.

The "management by exception" approach has inadequately shaped the current defense industrial base. DoD must seek out the essential capabilities and determine if they require some preservation assistance (this assumes the capability exists today). This new DoD method does offer an approach to evaluate the essentiality and fragility of capabilities. It could be the foundation of an effective alternative provided DoD integrates this new method at higher levels in the defense department and conducts the analysis in every sector of the defense industrial base as soon as possible.

Another possible methodology is a combined tier traceable/cross-sectional assessment. Today, most studies done on the industrial base are either a vertical analysis or a horizontal analysis. The vertical analyses in the past rarely have gone below the 3rd tier unless major problems have arisen and crisis management efforts invoked. The horizontal analyses, the typical sector surveys, have only looked at companies within a class of weapons systems used by one Service. The new methodology would trace a weapon not only down the entire industrial base structure, but across the entire structure as well. The analysis would cut across sectors, across Military Services and across the depot and spare parts functions. The goal is to find the truly unique capabilities and preserve them. Cutting across the industrial base structure offers insight into the availability of other existing means that may be a potential source for the capability under analysis. Insight, that is not available today, will be gained into both the depth and breadth

of the defense industrial base. This must be done in order to stop indictments such as this: "There has been no adequate, unbiased assessment of the defense industrial base in terms of what we need, how to retain it or how to develop it. Industry experts note the recent report completed by the Defense Department includes none of the data necessary to analyze the depth and extent of the problems facing key sectors of the industry, including subtier contractors and suppliers."¹

Implementing this methodology would require significant dedication and additional resources. A new management structure, a new data collection process, and a new information management system would be necessary. A properly shaped and focused DIB would require a change in DoD organizational culture and in the Service's cultures. DoD and Congress must take every effort to eliminate unnecessary duplication of weapons system acquisition resources. This entails combining or eliminating facilities such as production, research, testing, maintenance and even the sacrosanct depot system.

Follow-on Research Efforts

More research on the industrial base could further the understanding of the complex defense industrial base and to build on the premises presented here. DoD could benefit greatly from more research on the development of a new information management system that would provide accurate, timely data on the industrial base to DoD decision makers. DoD needs a new management structure for managing the DIB that could create a consolidated industrial base and make unbiased decisions. Weapons systems could be

¹ Congress, House, Committee on Armed Services, Industrial Base Panel, Future of the Defense Industrial Base, report of the Structure of U.S. Defense Industrial Base Panel, 102nd Cong., 2nd Sess., 1992, 15.

selected to model the two methodologies described above to see how effective they would be in identifying the essential unique capabilities and if the methods would be viable alternatives to the current methods. The JCS's requirements generation process also needs improvement in order to make more accurate estimates on the type and amount of material needed for military contingencies.

The challenge is to develop and implement a fundamentally different Industrial Base Program that can meet future U.S. requirements and objectives. The new defense industrial base must be a smaller, more robust, agile enterprise that becomes almost indistinguishable from the commercial industrial base. Barriers between the Military Services and between the military and commercial sectors must be removed and a 'virtual organization' created that can manage national security emergency planning and respond to changes in the technological, global economic, and political environments. Secretary of Defense William Perry states, "As we look at these issues with our defense industrial base today, we have demonstrated many ways of doing it wrong. I hope we have exhausted all of those alternatives now ... and [are] finally doing it the right way."² The U.S. is not there yet, and it must move quickly in order to have a defense industrial base ready in the 21st Century.

² William Perry, Secretary of Defense, "U.S. Military Acquisition Policy," Comparative Strategy 13, no. 1 (1994): 24.

BIBLIOGRAPHY

Articles

- Adelman, Kenneth L. "Defense Conversion: Bulldozing the Management." Foreign Affairs 71, no. 2 (Spring 1992): 26-47.
- Augustine, Norman. "Guns Into Butter: How to Do It Right." Washington Post, 29 November 1992, C1-4.
- Austin, Mike. "Managing the US Defense Industrial Base: Strategic Imperative." Parameters 24, no. 2 (Summer 1994): 27-84.
- Brinkerhoff, John R. "The American Strategy of Unpreparedness." Strategic Review 22 (Winter 1994): 34-42.
- _____. "Strategic Implications of Industrial Preparedness." Parameters 24, no. 2 (Summer 1994): 38-47.
- Berry, F. Clinton. "Maintaining the Defense Industrial Base." National Defense 76, no. 469 (July/August 1991): 6-9.
- Blackwell, James A. Jr. "The Defense Industrial Base." The Washington Quarterly 15, no. 4 (Autumn 1992): 189-206.
- Bond, David F. "Report Urges New Strategy to Maintain Defense Industry." Aviation Week & Space Technology, 5 August 1991, 65.
- Borrus, Amy and Thane Peterson. "A Life Raft for Arms Makers." Business Week, 16 March 1992, 122-124.
- Bowgrove, Evguene. "Conversion in Transitional Economies: The case of the Former USSR and Russia." Defence Economics 5, no. 2 (1994): 150-165.
- Brown, David A. "Defense Base Erosion Could Hurt Military Aircraft Exports." Aviation Week & Space Technology, 2 March 1992, 66.
- Budiansky, Stephen. "Flying Blind into a Turbulent Future." US News & World Report, 7 December 1992, 58-60.
- Cayer, Shirley. "Building a World-class Supplier Base is the Number-one Priority." Purchasing, 14 April 1988, 52-53+.
- Dunne, J. Paul. "The Changing Military Industrial Complex in the UK." Defence Economics 4, no. 2 (1993): 91-113.

- Egea, Alejandro Nadal. "Military R&D: The Economic Implications of Disarmament and Conversion." Defence Economics 5, no. 2 (1994): 132-145.
- Ferris, Stephen LT. "A Shortage of Seed Corn? Managing the Defense Industrial Base." Military Review 74, no. 6 (June 1994): 40-53.
- Franks, Bob and Marty Meehan. "A Bipartisan Strategy for U.S. Manufacturing." Issues in Science and Technology 11, no. 2 (Winter 1994-1995): 39-56.
- Fulghum, David A. "Air Force Proposes Industry Rescue Plan." Aviation Week & Space Technology, 18 October 1993, 35-36.
- _____. "Defense Conversion Plans Full of Flaws." Aviation Week & Space Technology, 16 November 1992, 18-19.
- Gansler, Jacques. "Restructuring the Defense Industrial Base." Issues in Science and Technology 8, no. 3 (Spring 1992): 50-58.
- Gill, Paul COL and LTC T. Smith. "Making a Difference Through Planning." Army Logistician, July-August 1989, 2-5.
- Gilmartin, Patricia A. "Maintaining Defense Base a Challenge for the '90s." Aviation Week & Space Technology, 7 June 1991, 66+.
- Harrigon, Anthony. "The American Economy and the National Interest." Vital Speeches of the Day 52, no. 13 (15 April 1986): 398-402.
- Hartley, Keith. "The UK Defense Industrial Base." The Political Quarterly 58, no. 1 (January-March 1987): 62-72.
- Hunter, Nick. "Ford to Chop Supplier Base for Production Parts by a Third." Purchasing, no. 111 (10 October 1991): 32A3.
- Kandebo, Stanley W. "Decision-makers Seek Definition of Defense Needs." Aviation Week & Space Technology, 24 May 1993, 46-47.
- King, Alfred M. "Risky Business: Defense Contractors after the Cold War." Management Accounting 75 (October 1993): 47-51.
- Leibstone, Marvin. "The US Defence Industrial Base: Can it Survive." Military Technology 15, no. 12 (December 1991): 12-13+.
- Levinson, Marc; John Barry. "Defense: The Real Debate." Newsweek, 15 July 1991, 34-38.

- Lovering, John. "Restructuring the British Defence Industrial Base after the Cold War: Institutional and Geographical Perspectives." Defence Economics 4, no. 2 (1993): 123-141.
- Mann, Paul. "Bush Administration Will Oppose Defense Industry Conversion Drive." Aviation Week & Space Technology, 6 August 1990, 20-21.
- Markusen, Ann and Joel Yudken. "Building a New Economic Order." Technology Review 95, no. 3 (April 1992): 23-28; 30.
- Moran, Theodore H. "The Globalization of America's Defense Industries. Managing the Threat of Foreign Dependence." International Security 15, no. 1 (Summer 1990): 57-99.
- Morrocco, John D. "Defense Conversion Panel Urges Dramatic Changes." Aviation Week & Space Technology, 25 January 1993, 64-65.
- _____. "McDonnell Douglas Cuts Supplier Base." Aviation Week & Space Technology, 9 November 1992, 24.
- _____. "Balanced Defense Acquisition Strategy Key to Retaining Healthy Industrial Base." Aviation Week & Space Technology, 25 May 1992, 58-59, 62.
- Nunn, Jack. "Defense Industrial Base Faces Radical Restructuring." Armed Forces Journal International 130 (December 1992): 36-40.
- Owens, Mackubin T. "Expand the Military - Industrial Complex? Yes Preparedness Requires It." ORBIS 33, no. 4 (Fall 1989): 539-548.
- Perry, Nancy. "What's Next For The Defense Industry." Fortune, 22 February 1993, 94-100.
- Perry, William. "U.S. Military Acquisition Policy." Comparative Strategy 13, no. 1 (1994): 19-24.
- Psihas, George P. "Maintaining the Defense Industrial Base." Vital Speeches of the Day 54, no. 6 (1 January 1993): 165-168.
- Renner, Michael. "Swords into Plowshares: Converting to a Peace Economy." Worldwatch Paper 96, June 1990, 6-10.
- Scott, William B., Carole A. Shifrin. "Recession Taking Toll on Sub-tier Companies." Aviation Week & Space Technology, 7 September 1992, 91-92.
- Scott, Winfield. COL. "The D to P Concept." Army Logistician 2, no. 3 (May-June 1970): 4-30.

Scrivner, Peter C. "Reform Efforts Gird Viability of US Base." National Defense 78, no. 498 (May/June 1994): 31-32.

Skibbie, Lawrence LTG (Ret.). "Enduring National Issues Requiring Attention." National Defense 77, no. 485 (February 1993): 4-15.

_____. "Prudent Defense Base Blueprint Critical to US Security." Army RD&A Bulletin, January-February 1994, 10-11.

_____. "Pentagon, Congress Must Support Restructuring of Fifth Service." National Defense 79, no. 500 (September 1994): 2.

_____. "Prudent Defense Base Blueprint Critical to US Security in the 90s." Army RD&A Bulletin, January-February 1994, 10-12.

Smith, Lee. "Coping with the Defense Build-down." Fortune, 29 June 1992, 88-90+.

Spiers, Joseph. "The Most Important Economic Event of the Decade." Fortune, 3 April 1995, 33-40.

Spring, Baker. "Supporting the Force: The Industrial Base And Defense Conversion." Heritage Foundation, no. 964 (October 1993): 1-10.

Sullivan, Leonard, Jr. "The New Relevance of Industrial Preparedness." The Atlantic Community Quarterly 24, no. 4 (Winter 1986/1987): 308-318.

Taylor, Trevor. "West European Defence Industrial Issues for the 1990s." Defence Economics 4, no. 2 (1993): 113-123.

Ullman, John E. "Building a Peacetime Economy." Technology Review 94, no. 6 (August/September 1991): 56-63.

Velocci, Anthony L. Jr. "Executives Blast Clinton Conversion Plan." Aviation Week & Space Technology, 24 March 1993, 27-28.

_____. "Many Small Aerospace Suppliers Endangered as Industry Consolidates." Aviation Week & Space Technology, 22 June 1992, 69.

_____. "US Defense Industry Must Change Ways to Stay Out of Financial Emergency Room." Aviation Week & Space Technology, 24 December 1990, 14-25.

Walker, William and S. Willett. "Restructuring the European Defence Industrial Base." Defence Economics 4, no. 2 (1993): 141-161.

Weidenbaum, Murray. "Can Defense Contractors Survive the New World Order?" Business and Society Review, no. 82 (1992): 50-55.

_____. "What Should Defense Contractors Do?" Across the Board 29, no. 10 (October 1992): 50-51.

Books and Published Reports

- Acker, David D. "Our American Industrial Base Where is it Headed? Is in on the Right Track?" In Acquisition for the Future: Proceedings of the 1991 Acquisition Research Symposium in Washington, DC, June 1991, by the Defense Systems Management College. Fort Belvoir, VA, 125-134.
- Alexander, Arthur. Of Tanks and Toyotas: An Assessment of Japan's Defense Industry. Santa Monica: RAND, 1991.
- Alic, John A. Beyond Spinoff. Boston: Harvard Business School Press, 1992.
- Baumbusch, G. Peacetime Adequacy of the Lower Tiers of the Defense Industrial Base. Santa Monica: RAND, 1977.
- Birkler, John, Joseph Large, Giles Smith, and Fred Timson. Reconstituting a Production Capability Past Experience, Restart Criteria and Suggested Policies. Santa Monica: RAND, 1993.
- Bitzinger, Richard. Adjusting to the Drawdown: The Transition in the Defense Industry. Washington, D.C.: The Defense Budget Project, 1993.
- Brzoska, Michael, and Peter Lock. Restructuring of Arms Production in Western Europe. New York: Oxford University Press, 1992.
- Camm, Frank. The Role of the DOD Cost Comparability Handbook in Air Force Public/Private Competitions. Santa Monica: RAND, 1993.
- Chudon, Michael P., and Kathryn Wittenben. After the Cold War Russian-American Defense Conversion for Economic Renewal. New York: New York University Press, 1993.
- Davis, Paul K. Defense Planning for the Post-Cold War Era. Giving Meaning to Flexibility, Adaptiveness, and Robustness of Capability. Santa Monica: RAND, 1993.
- Deitchman, S. J.. Beyond The Thaw a New National Strategy. New York: New York University Press, 1991.
- Dewar, James A. Assumption-Based Planning. A Tool for Very Uncertain Times. Santa Monica: RAND, 1993.
- Dunnigan, J. Getting it Right. New York: New York University Press, 1993.
- Franko-Jones, Patrice. The Brazilian Defense Industry. Boulder, CO.: Westview Press, 1992.

- Frost, Gerald. Assumption Based Planning Methodology Applied to Tank Industrial Base Options. Santa Monica: RAND, 1993.
- Gansler, Jacques. The Defense Industry. Cambridge: The MIT Press, 1980.
- _____. Affording Defense. Cambridge: The MIT Press, 1989.
- Graben, E. What Don't We Need Anymore. New York: New York University Press, 1992.
- Gregory, William. The Price of Peace The Future of Defense Industry and High Technology. New York: Lexington Books, 1993.
- Haglund, David. The Defence Industrial Base and the West. New York: Routledge, 1989.
- Hooks, Gregory. Forging the Military-Industrial Complex. Chicago: University of Illinois Press, 1987.
- Ikegami-Andersson, Masako. The Military-Industrial Complex. Brookfield: Dartmouth Publishing Company, 1992.
- Institute for Foreign Policy Analysis, Inc. The US Defense Mobilization Infrastructure: Problems and Priorities A Conference Report. Cambridge, MA: Institute for Foreign Policy Analysis, Inc., 1981.
- Kapstein, Ethan Barnaby. The Political Economy of National Security A Global Perspective. Columbia, SC: University of South Carolina Press, 1992.
- _____. Downsizing Defense. Washington, D.C.: Congressional Quarterly, Inc., 1993.
- Kirby, Ed S., and N. Hooper. The Cost of Peace: Assessing Europe's Security Options. Philadelphia: Harwood Academic Publishers, 1991.
- Krause, Keith. Arms and the State: Patterns of Military Production and Trade. Cambridge, England: Cambridge University Press, 1992.
- Libicki, Martin. What Makes Industries Strategic. Washington, D.C.: National Defense University, 1988.
- _____. Industrial Strength Defense a Disquisition on Manufacturing, Surge and War. Washington, D.C.: National Defense University, 1989.
- Lynch, John. Economic Adjustment and Conversion of Defense Industries. Boulder, CO: Westview Press, Inc., 1987.

- Markusen, Ann, Scott Campbell, and Sabina Deetrick. The Rise of the Gunbelt. New York: Oxford University Press, 1991.
- _____, and Joel Yudken. Dismantling the Cold War Economy. New York: Basic Books, 1992.
- Miskel, James F. Buying Trouble? National Security and Reliance on Foreign Industry. New York: University Press of America, Inc., 1993.
- Olvey, Lee, Henry Leonard, and Bruce Arlinghaus. Industrial Capacity and Defense Planning. Lexington, MA: Lexington Books, 1983.
- Rich, Michael. Evolution of the US Defense Industry. Santa Monica: RAND, 1990.
- Smith, Giles K., and CDR Chris Larsen. Reconstituting a Production Capability: An Analysis of Candidates for Production Re-Start. Santa Monica: RAND, 1992.
- Taylor, Trevor, and Keith Hayward. The UK Defence Industrial Base. McLean, VA: Pergamon-Brassey's International Defense Publishers, Inc., 1989.
- The Air Force Association. Lifeline in Danger An Assessment of the United States Defense Industrial Base. Arlington, VA: Aerospace Education Foundation, 1988.
- Tolchin, Martin, and Susan J. Tolchin. Selling Our Security. New York: Alfred A. Knoph, 1992.
- van Opstal, Debra. Integrating Commercial and Military Technologies for National Strength An Agenda for Change. Washington, D.C.: The Center for Strategic & International Studies, 1991.
- Vander Meulen, Jacob. The Politics of Aircraft Building an American Industry. Lawrence, KS: University Press of Kansas, 1991.
- Vawter, Roderick L. Industrial Mobilization: The Relevant History. Washington, D.C.: National Defense University, 1983.

Public Documents

Commercial Product Acquisition Team. Recommended Regulatory Changes to Eliminate Impediment to Commercial Product Acquisition. Washington, D.C.: June 1988.

Defense Production Act Amendments of 1992. Public Law 102-558 (1992).

National Defense Authorization Act FY 94. Public Law 106-160 (1993).

The Defense Production Act. U.S. Code. Vol. 50, sec 2061 (1950).

U.S. Air Force. Air Force Systems Command. AFSC Industrial Base Planning Guide 1989. Wright Patterson AFB, OH: 1989.

_____. Air Force Systems Command. Strategic Industrial Initiative AFSC Industrial Base Assessment. Wright Patterson AFB, OH: July 1990.

_____. Industrial Base Assessment Division. North American Defense Industrial Base Organizations and Manufacturing Data Technologies. Wright Patterson AFB, OH: December 1990.

_____. Industrial Base Assessment Division. Executive Summary Report Space & Missile Industrial Base Assessment. Wright Patterson AFB, OH: December 1990.

_____. Industrial Base Assessment Division. Summary Report Bomber & Airlift Industrial Base Assessment. Wright Patterson AFB, OH: September 1991.

_____. Industrial Base Assessment Division. Executive Summary from the Report on Munitions Industrial Base Assessment. Wright Patterson AFB, OH: November 1991.

_____. Air Force Systems Command. 1991 Air Force Industrial Base Strategic Plan. Wright Patterson AFB, OH: 1991.

_____. Industrial Base Assessment Office. Industrial Base Assessment of the Fighter Sector. Wright Patterson AFB, OH: March 1992.

_____. Air Force Material Command. "Aircraft Sector Health Quick Look." Briefing by CAPT Snyder, Wright Patterson AFB, OH: 1992.

_____. Air Force Material Command. Air Force Industrial Base "Quick Look." Wright Patterson AFB, OH: September 1992.

- _____. Air Force Material Command. Program Specific Industrial Base Assessment Guidebook. Wright Patterson AFB, OH: February 1993.
- _____. Industrial Base Planning. AF Policy Directive 63-6. Washington, D.C.: April 1993.
- _____. Air Force Material Command. Manufacturing 2005. Wright Patterson AFB, OH: July 1993.
- _____. Air Force Material Command. Defense Technology and Industrial Base Forecasting Method. Wright Patterson AFB, OH: December 1993.
- _____. Industrial Base Assessment Office. Industrial Base Assessments. Wright Patterson AFB, OH: February 1994.
- _____. Program Management Directive for Industrial Base Program. PMD 7041(12). Washington, D.C.: June 1994.
- _____. Headquarters. "Industrial Capabilities: Making Better Decisions." Briefing. Washington, D.C.: April 1995.
- U.S. Army. Planning Logistics Support for Military Operations. FM 701-58. Washington, D.C.: September 1982.
- _____. Letter from HQ, DA to HQ, Army Materiel Command. "Functions and Relationships for Industrial Base Preparedness Planning." Alexandria, VA, April 1990.
- _____. OMA Accounts for Industrial Preparedness Operations. FY 1994 Budget Summary. Washington, D.C.: November 1993.
- _____. Army Materiel Command. Study of Army Logistics. Alexandria, VA: August 1981.
- _____. Army Materiel Command. Industrial Preparedness Sector Study Guideline. Alexandria, VA: March 1990.
- _____. Army Materiel Command. Graduated Mobilization Response. Alexandria, VA: April 1990.
- _____. Army Materiel Command. Industrial Preparedness Functional Area Assessment. Alexandria, VA: November 1990.
- _____. Army Materiel Command. Strategy White Papers. Alexandria, VA: May 1992.
- _____. Army Materiel Command. Industrial Base Sector Surveys. Alexandria, VA: October 1992.

- _____. Army Material Command. 1992 Army Industrial Base Sector Studies. Alexandria, VA: 1992.
- _____. Letter from HQ, Army Material Command to Office of the Secretary of Defense. "Essential/Domestic Capability Guidelines." Alexandria, VA, October 1994.
- _____. Industrial Engineering Activity. 1991 Army Production Base Analysis. Rock Island, IL: 1991.
- _____. Industrial Engineering Activity. Electro-optics Sector Survey. Rock Island, IL, August: 1992.
- _____. Industrial Engineering Activity. Satellite/Communications Sector Survey. Rock Island, IL: August, 1992.
- _____. Industrial Engineering Activity. Small Missile Sector Survey. Rock Island, IL: August 1992.
- _____. Industrial Engineering Activity. Sensors Subsector Survey. Rock Island, IL: August 1992.
- _____. Industrial Engineering Activity. US Army Production Base Analysis Parts I & II. Rock Island, IL: 1993.
- _____. Industrial Engineering Activity. U.S. Army Industrial Base Analysis. Rock Island, IL: October 1994.
- U.S. Competitiveness Policy Council. Enhancing American Competitiveness. Report to President and Congress. Washington, D.C.: GPO, 1993.
- _____. A Competitiveness Strategy for America. Report to President and Congress. Washington, D.C.: GPO, 1993.
- _____. Promoting Long-Term Prosperity. Report to President and Congress. Washington, D.C.: GPO, 1994.
- U.S. Congress. House. Committee on Government Operations. Management of the Defense Industrial Base. Hearing before the Legislation and National Security Subcommittee. 101st Cong., 1st Sess., July 1989.
- _____. Defense Production Act Amendments of 1990. 101st Cong., 2nd Sess., September 1990.
- _____. Banking, Finance and Urban Affairs Committee. Defense Production Act. 102nd Cong., 1st Sess., June 1991.

- _____. Defense Production Act Amendments of 1991. 102nd Cong., 1st Sess., September 1991, H.R. 102-208.
- _____. Defense Production Act Amendments of 1991. 102nd Cong., 1st Sess., October 1991, H.R. 102-208.
- _____. Committee on Armed Services. Defense Industrial Base: Hearings before the Defense Industrial Base Panel. 102nd Cong., 1st Sess., March 1992, H.R. 102-54.
- _____. Committee on Armed Services. Future of the Defense Industrial Base. Report of the Structure of U.S. Defense Industrial Base Panel. 102nd Cong., 2nd Sess., April 1992, Committee Report 10.
- _____. Appropriations Committee. FY 1993 DOD Budget: Hearing before the Appropriations Committee. 102nd Cong., 1st Sess., September 1992.
- _____. Authorization Committee. FY 1993 DOD Budget: Hearing before the Authorization Committee. 102nd Cong., 1st Sess., October 1992.
- _____. Authorization Committee. FY 1994 DOD Budget: Hearing before the Authorization Committee. 103rd Cong., 2nd Sess., July 1993.
- _____. Appropriations Committee. FY 1994 DOD Budget: Hearing before the Appropriations Committee. 103rd Cong., 2nd Sess., September 1993.
- _____. Authorization Committee. FY 1995 DOD Budget: Hearing before the Authorization Committee. 103rd Cong., 2nd Sess., May 1994.
- U.S. Congress. Senate. Committee on Armed Services. Manufacturing Capabilities of Key Second Tier Defense Industries: Hearing before the Subcommittee on Defense Industry and Technology. 100th Cong., 1st Sess., 23 July 1987.
- _____. Appropriations Committee. FY 1993 DOD Budget. 102nd Cong., 2nd Sess., September 1992.
- _____. Committee on Armed Services. Department of Defense Authorization for Appropriations for Fiscal Year 1994 and the Future Years Defense Program. 103rd Cong., 1st Sess., June 1993.
- _____. Appropriations Committee. FY 1994 DOD Budget: Hearing before the Appropriations Committee. 103rd Cong., 2nd Sess., June 1993.
- _____. Authorization Committee. FY 1994 DOD Budget: Hearing before the Authorization Committee. 103rd Cong., 2nd Sess., July 1993.

- _____. Authorization Committee. FY 1995 DOD Budget: Conference Report. 103rd Cong., 2nd Sess., October 1993.
- _____. Authorization Committee. FY 1995 DOD Budget: Hearing before the Authorization Committee. 103rd Cong., 2nd Sess., June 1994.
- U.S. Congress. Office of Technology Assessment. Holding the Edge: Maintaining the Defense Technology Base. Washington, D.C.: GPO, 1989.
- _____. Holding the Edge: Maintaining the Defense Technology Base Volume 2. Washington, D.C.: GPO, 1990.
- _____. Redesigning Defense: Planning the Transition to the Future US Defense Industrial Base. Washington, D.C.: GPO, 1991.
- _____. Adjusting to a New Security Environment. The Defense Technology and Industrial Base Challenge. Washington, D.C.: GPO, 1991.
- _____. American Military Power: Future needs. Future choices. Washington, D.C.: GPO, 1991.
- _____. Building Future Security Strategies for Restructuring the Defense Technology and Industrial Base. Washington, D.C.: GPO, 1992.
- _____. Airbus Industrie: An Economic and Trade Perspective. Washington, D.C.: GPO, 1992.
- _____. Defense Conversion Redirecting R&D. Washington, D.C.: GPO, 1992.
- _____. Defense Conversion Redirecting R&D; Summary. Washington, D.C.: GPO, 1992.
- _____. Lessons in Restructuring Defense Industries: French Experience. Washington, D.C.: GPO, 1992.
- _____. Assessing the Potential of Civil-Military Integration. Washington, D.C.: GPO, 1994.
- U.S. Defense Advanced Research Projects Agency. Breaking the Mold Forging a Common Defense Manufacturing Vision. Washington, D.C.: National Academy Press, 1993.
- U.S. Defense Conversion Commission. Adjusting to the Drawdown. Washington, D.C.: GPO, 1992.
- _____. Defense Drawdown: Financial Overview and Strategies for the Top 25 Prime Contractors. Washington, D.C.: GPO, 1993.

U.S. Defense Logistics Agency. Defense Electronic Systems Command. Study of the Influence of Technological Change and Diminishing Manufacturing Sources. Richmond, VA: 1979.

_____. Defense Personnel Support Center. Directorate of Clothing and Textiles. Production Base Analysis Fiscal Year 1990. Alexandria, VA: 1990.

_____. Defense Contract Management Command. "Industrial Analysis Support Process Implementation Brief (w/forms)." Briefing. Philadelphia, PA: 1 February 1993.

_____. Defense Contract Management Command. Industrial Analysis Support Conference Manual. Alexandria, VA: December 1993.

_____. Defense Contract Management Command. Industrial Support for Weapons Readiness. Alexandria, VA: March 1995.

_____. Headquarters. "Command Overview Briefing." Briefing. Alexandria, VA: April 1995.

U.S. Defense Science Board. The Defense Industrial Technology Base. Washington, D.C.: October 1988.

_____. The Defense Industrial and Technology Base 1988 Summer Study Final Report Volume II. Washington, D.C.: December 1988.

_____. Use of Commercial Components in Military Equipment. Washington, D.C.: June 1989.

_____. Report of the Defense Science Board Task Force on Aircraft Assessment. Washington, D.C.: February 1991.

_____. 1991 Defense Science Board Summer Study on Defense Technology Strategies. Washington, D.C.: November 1991.

_____. 1991 Summer Study on Weapon Development and Production Technology. Washington, D.C.: November 1991.

_____. FY 1994-99 Future Years Defense Plan. Washington, D.C.: May 1993.

_____. Defense Science Board Summer Study on Defense Manufacturing Strategy. Washington, D.C.: June 1993.

_____. Report of Defense Science Board on Tactical Aircraft Bottom Up Review. Washington, D.C.: July 1993.

- _____. Summer Study Task Force on the Defense Manufacturing (Enterprise) Strategy. Washington, D.C.: August 1993.
- _____. Tracked Vehicle Industrial Base. Washington, D.C.: GPO, April 1994.
- _____. Depot Maintenance Management. Washington, D.C.: April 1994.
- _____. Antitrust Aspects of Defense Industry Consolidation. Washington, D.C.: April 1994.
- U.S. Defense Systems Management College. Integrating Industrial Preparedness into the Acquisition Process. A Guide for Program Managers. Washington, D.C.: GPO, April 1989.
- U.S. Department of Commerce. Report to Congress on the Defense Industrial Base: Critical Industries Planning. Washington, D.C.: GPO, October 1990.
- _____. National Security Assessment of the US Gear Manufacturing Industry. Washington, D.C.: GPO, January 1991.
- _____. National Security Assessment of the Domestic and Foreign Subcontractor Base: A Study of Three US Navy Weapon Systems. Washington, D.C.: GPO, March 1992.
- _____. National Security Assessment of the US Forging Industry. Washington, D.C.: GPO, December 1992.
- U.S. Department of Defense. Office of the Secretary of Defense. An Industrial Mobilization Handbook for Government. Washington, D.C.: GPO, 1985.
- _____. Industrial Preparedness Planning. DOD Instruction 4005.3. Washington, D.C.: April 1985.
- _____. Industrial Preparedness Program. DOD Directive 4005.1. Washington, D.C.: November 1985.
- _____. "DD Form 1519." Army Industrial Preparedness Production Planning Forms. Washington, D.C.: GPO, 1990.
- _____. DOD Critical Technologies Plan. Washington, D.C.: March 1990.
- _____. The Defense Industrial Base. Report to Congress. Washington, D.C.: February 1991.
- _____. JOPES Committee. "Briefing on Joint Industrial Mobilization Planning Process." Briefing. Alexandria, VA: November 1991.

- _____. The Defense Industrial Base. Report to Congress. Washington, D.C.: November 1991.
- _____. Report to Congress on the Defense Industrial Base. Washington, D.C.: November 1991.
- _____. JOPES Committee. White paper on Joint Industrial Mobilization Planning Process. Alexandria, VA: 1991.
- _____. "Production Base Assessment Working Group Meeting notes." Notes by Rod Vawter. Alexandria, VA: 1991.
- _____. National Defense Manufacturing Technology Plan. Task Force report to Congress. Washington, D.C.: March 1992.
- _____. Development of a National Defense Manufacturing Technology Plan. Report to Congress. Washington, D.C.: March 1992.
- _____. Office of the Secretary of Defense. Assessing the Adequacy of the Industrial Base. Washington, D.C.: May 1992.
- _____. Office of the Secretary of Defense. Industrial Base White Papers. Washington, D.C.: June 1992.
- _____. "Defense Budget Project." Briefing to Defense Conversion Commission. Washington, D.C.: August 1992.
- _____. Office of the Secretary of Defense. Industrial Base Program. Draft DOD Directive 4005.1. Washington, D.C.: August 1992.
- _____. Office of the Secretary of Defense. Industrial Base Oversight. Report for Defense Conversion Commission. Washington, D.C.: September 1992.
- _____. Office of the Secretary of Defense. The Military Critical Technologies List. Washington, D.C.: October 1992.
- _____. Industrial Analysis Support Agency. "Briefing on how to utilize the new DD 2575 Forms." Briefing. Philadelphia, PA: 1992.
- _____. "DD Forms 2575/2575-1." DOD Industrial Base Production Forms. Washington, D.C.: GPO, 1992.
- _____. Letter from Secretary of Defense to GAO. "Tasking Letter for GAO Report on Defense Conversion." Washington, D.C., 1992.

- _____. Defense Acquisition White Paper. Washington, D.C.: 1992.
- _____. Inspector General. Review of the Defense Industrial Base. Washington, D.C.: GPO, June 1993.
- _____. Inspector General. Excess Engine Production Report. Washington, D.C.: June 1993.
- _____. Office of the Secretary of Defense. Armored Systems Industrial Base Sector Study. Washington, D.C.: August 1993.
- _____. The 1993 National Defense Industrial Base Capability Assessment Report to Congress. Washington, D.C.: September 1993.
- _____. "Ensuring Defense Industrial Base Capacities, Capabilities." Defense 93, Washington, D.C.: GPO, 1993.
- _____. Letter from Office of the Secretary of Defense to each Military Service. "Essential/Domestic Capability Guidance." Washington, D.C., July 1994.
- _____. Building U.S. Capabilities in Flat Panel Display. Report of the Flat Panel Display Task Force. Washington, D.C.: September 1994.
- _____. Report to Congress on the Industrial Capabilities for Defense. Washington, D.C.: September 1994.
- _____. Report to Congress on the Conventional Ammunition Industrial Assessment Phase I. Washington, D.C.: September 1994.
- _____. "Acquisition Reform A Mandate for Change." Briefing by Les Aspin, Secretary of Defense. Washington, D.C.: 1994.
- _____. Office of the Secretary of Defense. Industrial Assessment for Space Launch Vehicles. Washington, D.C.: January 1995.
- _____. Office of the Secretary of Defense. Assessing Defense Industrial Capabilities Handbook (Draft). Washington, D.C.: March 1995.
- _____. Office of the Secretary of Defense. "Industrial Capabilities Making Better Decision." Briefing by Martin Meth. Washington, D.C.: April 1995.
- _____. Secretary of Defense. Annual Report to the President and the Congress. Washington, D.C.: GPO, 1995.

- _____. Office of the Secretary of Defense. FY 1995-1999 Defense Planning Guidance. Washington, D.C.: GPO, 1995.
- U.S. Federal Emergency Management Agency. Graduated Mobilization Response Planning Guidance Manual. Washington, D.C.: GPO, June 1992.
- U.S. General Accounting Office. DOD's Industrial Preparedness Program Needs National Policy to Effectively Meet Emergency Needs. Washington, D.C.: May 1981.
- _____. Overview of the Status of the Defense Industrial Base and DOD's Industrial Preparedness Planning. Washington, D.C.: GPO, May 1985.
- _____. Assessing Production Capabilities And Constraints In the Defense Industrial Base. Washington, D.C.: GPO, April 1985.
- _____. Industrial Base Defense-Critical Industries. Washington, D.C.: GPO, August 1988.
- _____. Adequacy of Information on the US Defense Industrial Base. Washington, D.C.: GPO, November 1989.
- _____. Significance of DOD's Foreign Dependence. Washington, D.C.: GPO, January 1991.
- _____. DOD Needs Better Method of Identifying Critical Technology Funding. Washington, D.C.: GPO, February 1992.
- _____. "Potential Reductions in Command, Control, and Communications Satellite Programs." Briefing on 1993 DOD Budget. Washington, D.C.: 1993.
- _____. Defense Industrial Base. Washington, D.C.: GPO, March 1993.
- _____. Efforts to Address Engine Recuperator Problems. Washington, D.C.: GPO, March 1993.
- _____. Defense Industrial Base: An Overview of Emerging Issues. Washington, D.C.: GPO, March 1993.
- _____. Impact of Defense Downsizing on Selected Abrams Tank Subcontractors. Washington, D.C.: GPO, July 1993.
- U.S. Industrial College of The Armed Forces. Peacetime Industrial Production Expansion. Washington, D.C.: 1979.
- _____. Defense Industry Study #6 Land Vehicles. Washington, D.C.: 1991.

_____. Industry Studies Report. Washington, D.C.: 1992.

_____. Industry Studies Report. Washington, D.C.: 1993.

U.S. International Trade Commission. Competitive Position of the US Gear Industry in US and Global Markets. Washington, D.C.: GPO, April 1990.

U.S. Navy. Naval Sea Systems Shipbuilding Support Office. "Briefing on Mission." Briefing. Philadelphia, PA: April 1992.

_____. Navy Shipbuilding Supporting Industry Capacity Utilization Trends FY '91. Philadelphia, PA: 1992.

_____. Center for Naval Analyses. Shrinking the Defense Infrastructure. Conference Summary. Philadelphia, PA: May 1993.

_____. Letter to Office of the Secretary of Defense. "Essential/Domestic Capability Guidelines." Washington, D.C., October 1994.

_____. Sector Studies. Washington, D.C.: 1994.

U.S. President. Executive Order 12656. "Assignment of Emergency Management Preparedness Responsibilities." Federal Register (23 November 1988) vol. 53, no. 226, p. 47491.

_____. Executive Order 12919. "National Defense Industrial Resources Preparedness." Federal Register (7 June 1994) vol. 59, no. 108, p. 29525.

_____. Proclamation. "National Security Strategy of the United States." Washington, D.C.: GPO, 1991.

_____. Proclamation. "A National Security Strategy of Engagement and Enlargement." Washington, D.C.: GPO, 1995.

Unpublished Materials

Aadland, Anders B. LTC. "Baseline Assessment of the Combat Vehicles." Unpublished Research Project, Industrial College of the Armed Forces, Washington, D.C.: 1992.

Air Force Association. "The Fourth Pillar: Reconstitution and the Industrial Base." Washington, D.C.: Committee on Defense Industrial Base and Science and Technology, June 1993.

Anders, William A. "Rationalizing America's Defense Industry." Speech at Defense Week 12th Annual Conference, Washington, D.C.: 30 October 1991.

_____. "Revisiting the Rationalization of America's Defense Industrial Base." Speech to Aerospace Industries Association, Washington, D.C.: 27 October 1992.

Aspin, Les, Representative. "Getting the Right Defense and the Industrial Base to Produce It." Speech to Armed Forces Communications and Electronics Association, Washington, D.C.: 28 April 1992.

Augustine, Norm. "National Industrial Strategy." Briefing presented at the Defense System Management College, Alexandria, VA: 4 December 1992.

AUSA & ADPA. "A New Strategy for Defense Acquisition." Briefing for the Defense Conversion Commission, Washington, D.C.: September 1992.

_____. "Seminar Series on US Defense Industrial Base Preparedness." Alexandria, VA: AUSA, September 1992.

_____. "Defense Industrial Base Briefing." Briefing at AUSA meeting, Alexandria, VA: May 1992.

BDM. Technology Base Enhancement Program Metal Matrix Composites. McLean, VA: NADIBO, 1993.

_____. North American Defense Industrial Base Organization Sector Studies Report. McLean, VA: NADIBO, October 1993.

_____. Concepts to Strengthen the Navy Industrial Base. McLean, VA: Study for Office of Secretary of Defense, February 1994.

Bailer, Richard LTC. "Sustaining the Defense Industrial Base." Unpublished Research Paper US Army War College, Carlisle, PA: 1993.

Barnett, Dick, Industrial Base Director Army Material Command. Interview by author 3 April 1995, Alexandria, VA. HQ AMC, Alexandria.

Beverly, Bonello. Evaluating the availability, role, and performance of subcontractors in the Aerospace Industry. University of Notre Dame, IN: Study for Air Force Systems Command. 1983.

Bischak, Greg. "Successful Conversion Experiences." Washington, D.C.: Commission for Economic Conversion, May 1992.

Center for Strategic & International Studies. Deterrence in Decay: the Future of the US Defense Industrial Base. Washington, D.C.: CSIS Final Report on the Defense Industrial Base Project, May 1989.

_____. Integrating Commercial and Military Technologies for National Strength. Washington, D.C.: Commission on Security and Technology, 1991.

_____. "Critical Issues in Defense Conversion." Washington, D.C.: CSIS Senior Group on Defense Conversion, 1994.

Conver, Stephen. "Shaping the Defense Industrial Base of the Future." Washington, D.C.: Assistant Secretary of the Army for Research Development and Acquisition, 1992.

Dobeasky, Don, John Starns, and Joe Ruzzi. Industrial Base Analysis of the Impact of Desert Shield on Critical Air Force Weapons. Washington, D.C.: Analytic Science Corporation for Department of Air Force, July 1992.

Fabrie, Bob, Industrial Base Director, Defense Logistics Agency. Interview by author 3 April 1995, Alexandria, VA. DLA Headquarters, Alexandria.

Fisher, Chris, Industrial Base Analyst, Office of the Secretary of Defense. Interview by author 5 April 1995, Washington, D.C.. Pentagon, Washington.

Flythe, Mary C. Joint Industrial Mobilization Planning Process Vendor Level Model User's Guide. Alexandria, VA: Institute for Defense Analysis for Office of Secretary of Defense, April 1993.

Fontaine, Richard A. and J. Mulhern. An Application of Planning Theory to Industrial Mobilization Planning. Arlington, VA: ANSER, December 1989.

Frisch, Franz A., Research Director, DSMC. Interview by author 3 October 1992, Alexandria, VA. DSMC, Alexandria.

Gentsch, Eric L., and D. Peterson. A Method for Industrial Base Analysis: Aerospace Case Study. Alexandria, VA: Logistics Management Institute, 1993.

_____, and J. McInnis. A Profile of Defense Manufacturing Costs and Enabling Technologies. Alexandria, VA: Logistics Management Institute, 1993.

Goodman, John B., Director OSD Industrial Affairs. Interview by author 6 April 1995, Washington, D.C.. Pentagon, Washington.

Grichar, James. "U.S. Semiconductor Industrial Policy: A Qualified Success." Washington, D.C.: Federal Emergency Management Agency, 1993.

Griffin, Darold, Director AMC Industrial Base Office. Interview by author, 12 July 1993, Alexandria, VA. AMC, Alexandria.

Hill, Christopher T. "The Manufacturing Forum A Final Report of Discussions." Washington, D.C.: National Academy of Engineering, 1993.

Holly, J. W. LTC. "A Defense Industrial Base Strategy a PM's Perspective." Unpublished Research Paper, Industrial College of the Armed Forces, Washington, D.C.: 1993.

Institute of Defense Analysis. "Industrial Base Planning Assessment Process." Alexandria, VA: Briefing slides on Industrial Base Process, 1992.

Jack Faucett Associates. The Development of Separate Military and Civil Production Requirements. Washington, D.C.: Report for Federal Emergency Management Agency, 1991.

Jones, Steve COL, Director of the Defense Conversion Commission. Interview by author, 23 September 1992, Washington, D.C.. 1825 K St., Washington.

Kanter, Hershel and Richard H. VanAtta. Integrating Defense into the Civilian Technology and Industrial Base. Alexandria, VA: Institute for Defense Analysis for Office of the Assistant Secretary of Defense for Production and Logistics, February 1993.

Karl, Fedorochko. "A Contemporary Approach to Three Real World Problems: Near Term Readiness Surge, and Mobilization." Unpublished Research Paper, Industrial College of the Armed Forces, Washington, D.C.: 1981.

Keith, Donald. "Preamble and First Order Principles to Defense Science Board." Washington, D.C.: May 1993.

Kelm, Brian R. CDR, Industrial Base Program Manager, Assistant Secretary of the Navy (Research Development & Acquisition). Interview by author, 3 April 1995, Washington, D.C.. Pentagon, Washington.

Kirby, Wendy T. Esq. Commercial Practices for Commercial Products. A Comparison of Government and Commercial Contract Terms. Washington, D.C.: Report for Scientific Apparatus Makers Association, May 1988.

Koechal, Brian. "The Surge Capability of the US Industrial Base: A Macro View." Unpublished Research Paper, Armed Forces Institute of Technology, Wright Patterson AFB, OH: 1993.

Koonce, David M. Current Trends in The Defense Industry A Financial Overview. Washington, D.C.: Martin Marietta Corporation, 1993.

Linke, Stephen, Industrial Base Analyst, Assistant Secretary of the Army (Research Development & Acquisition). Interview by author 4 April 1995, Washington, D.C.. Pentagon, Washington.

McGillicuddy, James R. "Defense Industrial Base Strategy for the 1990's." Unpublished Research Paper The Industrial College of the Armed Forces, Washington, D.C.: 1993.

McVey, Peter MG (Ret.), PEO Armored Systems. Interview by author 24 November 1992, Warren, MI. PEO offices, Warren.

Meth, Martin, Industrial Base Analyst, OSD. Interview by author 10 April 1995, Washington, D.C.. Pentagon, Washington.

NADIBO. Continental Preparedness Strengthening the North American Defense Industrial Base. Washington, D.C.: NADIBO, March 1987.

Peterson, Donna. Implementing Industrial Base Study Recommendations. Alexandria, VA: Logistics Management Institute, 1990.

Porter, David L. CDR. "Can the Defense Technology Industrial Base Meet Surge Requirements?" Unpublished Research Paper, U.S. Naval War College, Newport, RI: 1992.

Powell, Gary, Industrial Base Analyst, Office of the Secretary of Defense. Interview by author 4 April 1995, Washington, D.C.. Pentagon, Washington.

QuesTech. "QuesTech High-Tech Applications Briefing." Wright Patterson AFB, OH: Research Division, 1993.

_____. "QuesTech Capabilities Briefing." Wright Patterson AFB, OH: Research Division, 1994.

_____. Industrial Base Program Night Vision Image Intensifier. Alexandria, VA: Research Division, 1994.

Quinn, James H. "Industrial Preparedness Planning: A Review of the Literature." Philadelphia, PA: Center for Naval Analyses, 1988.

Reed, Leon S. The Defense Production Act and Industrial Base Programs: Impact of the 1992 Amendments. Arlington, VA: The Analytical Science Corporation, October 1992.

Rogers, Ernest R. LTC. "The Sustaining Base - How Significant are the Shortcomings?" Unpublished Research Paper, School of Advanced Military Studies U.S. Army Command and General Staff College, Fort Leavenworth, KS: 1991.

Sabatino, Vincent J. "Planning with Industry Via Production Planning Schedule System." Alexandria, VA: Army Material Command, 1989.

Schaffer, Mark, Director IB Assessment Office. Interview by author 10 January 1993, Washington, D.C.. Pentagon, Washington.

Scott, D. "The Integrated Civilian Industrial Mobilization Planning Process Phase 1." Washington, D.C.: Federal Emergency Management Agency, December 1990.

_____. "The Integrated Civilian Industrial Mobilization Planning Process Phase 2." Washington, D.C.: Federal Emergency Management Agency, January 1992.

_____. "A Quantitative Multi-Model of US Aircraft Industry in '90s." Washington, D.C.: Federal Emergency Management Agency, April 1993.

_____. "Critical Industrial Sectors Series: US Aerospace Industry." Washington, D.C.: Federal Emergency Management Agency, March 1993.

Shipbuilders Council. "DOD Economic Conversion Commission Briefing." Washington, D.C.: Shipbuilders Council, September 1992.

Skibbie, Lawrence F. LTG (Ret.). "Seminar Series on US Defense Industrial Base Preparedness." Arlington, VA: AUSA and ADPA, September 1992.

- Smith, Kevin, Director Textron Lycoming Purchasing. Interview by author, 20, 21 April 1993, Stratford, CT. Textron Lycoming Plant, Stratford.
- Snyder, William MAJ, Industrial Base Analyst, HQ, U.S. Air Force. Interview by author 6 April 1995, Washington, D.C.. Pentagon, Washington.
- Speth, Harry, Director NAVSHIPSO. Interview by author, 29 January 1993, Philadelphia. U.S. Navy Ship Yard, Philadelphia.
- Spinney, Franklin. "Anatomy of Decline." Washington, D.C.: Defense Science Board, August 1993.
- Todaro, John, Director Industrial Base Policy Office. Interview by author 3 October 1992, Washington, D.C.. Pentagon, Washington.
- Taylor, W. Defense Economics for the 1990's: Resources, Strategies and Options. Washington, D.C.: Center for Strategic and International Studies, April 1989.
- Thomas, D. "The Industrial Base: Facing Extinction." Unpublished Research Paper, Army War College, Carlisle, PA: 1992.
- Thomason, James S. Graduated Mobilization Response Planning for the Department of Defense: Concepts, Responsibilities, and Options. Alexandria, VA: Institute for Defense Analysis, 1991.
- _____. Designing and Assessing National Security Resource Preparedness. Alexandria, VA: Institute for Defense Analysis, 1993.
- TRW. Defense Industrial Base Issues. Washington, D.C.: Study for DARPA TQM Task Force, 1991.
- Vawter, Rod, DOD Industrial Base Analyst. Interview by author, 2 October 1992, Alexandria, VA. Industrial Policy Office, Alexandria.
- _____, Interview by author telephonically, 27 March 1995, Newport, RI. Naval War College, Newport.
- Vogel, G. COL. "Defense Industrial Base Adequacy Assessment for Guided Munitions." Unpublished Research Paper, Air Force War College, AL: 1986.
- Williams, Richard M. "Small Business Manufacturing -- An Important Component of the U.S. Defense Industrial Base." Unpublished Research Paper The Industrial College of the Armed Forces, Washington, D.C.: 1993.